An Analysis of the Characteristics of Temporary Employment in the Ecuadorian Labor Market: A Microeconometric Study

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1 Introduction

Employment stability has been a widely discussed topic among Ecuadorian policy makers. In the last few decades Latin American economies have become increasingly volatile. In response, many countries have enacted policies to increase the flexibility of their labor markets, to mitigate the high levels of unemployment. These new contractual regulations allowed firms to hire employees with fewer employer liabilities and contract expiration or dismissal costs. As Belot et al. (2002) explain, many reforms in the labor market produce the intensification of the use of contracts that foster low firing costs. In Ecuador, labor flexibility in Ecuador started to be implemented in 1990 with a legislation called *Ley of Maquilas* (Factories Law).[1] Subsequently, a whole body of new legislations was issued in the 1990s and the beginning of 2000s, complementing the previous regulations, introducing new types of flexible structures for hiring workers, in order to reduce unemployment (See Aguiar 2007). As Blank and Freeman (1994) explain, the objective of changing the legal structure of labor contracts is to diminish the effect of unemployment. Since the introduction of these employment structures, many employees have been hired under these types of contracts. Many politician and policy makers, unions, employees and social sectors have argued against these new flexible labor contracts claiming that they have negative consequences on the relative stability of the workers and did not have significant positive impacts on aggregate unemployment and job quality. In 2008, the National Assembly of Ecuador decided to eliminate many types of flexible labor contracts.

Consequently, the role of temporary contracts has increased interest and concern among researchers and policy makers. In this context, it is necessary to identify and understand the fundamental variables that characterize temporary employment, because as De Cuyper et al. (2008) explain, the contractual structures have an effect not only on the employee's side but also on the demand (firms) side of the labor market. In this paper we study the determinants of temporary contracts in the Ecuadorian labor market, as well as the differences in the probability of men and women of obtaining this type of contract. As, Boeri et al. (2005) explain, different characteristics may determine the labor market behavior of women. Therefore, it is necessary to study and understand the variables that influence temporary employment in order to provide policy recommendations and contribute from an academic perspective to the discussion of the Ecuadorian labor market structure.

Various methods help to explore the structure of temporary employment. We are going to undertake several analysis that use micro data, in order to identify the determinants and the individual characteristics associated with temporary employment. Additionally, it is important to analyze whether men and women have dissimilar motives for working un-

[1] Maquilas are manufacturing factories that operate in a free trade zones, under duty-free and tariff-free conditions.

der temporary contracts. As we are going to see in this analysis, men and women, indeed, have different reasons for engaging in temporary employment. There are diverse personal, occupational, regional, and institutional reasons that influence this decision and it is necessary to measure the impact of these characteristics in the probability of having a temporary contract.

The organization of the paper is as follows. Section 2 presents a brief review of the literature. Section 3 provides an overview of the characteristics of the Ecuadorian labor market. Section 4 offers the description of the methodology underlying the empirical work and describes the data set extracted from the ENEMDU. Section 5 presents the estimation results. Finally, a succinct conclusion in Section 6 completes the paper.

2 A Brief Review of the Literature

In Ecuador, labor instability and underemployment has been a severe problem for the last two decades. In this context, temporary employment has gradually become an important topic in terms of the political and economic discussion. The increase in the use of flexible contracts has been widely discussed in the literature. Uzzi et al. (1998) explain the displacement and substitution of permanent employments with temporary employments in United States and other industrialized countries. Booth et al. (2002) and the report of the OECD (2002), devoted considerable attention to the analysis of contractual situations and the effects on employees. The literature uses diverse methods to identify the main elements that have an effect on temporary employment. Also, there are several perspectives to explain the factors that influence temporary employment. Many literature contributions that explain the phenomenon of temporary employment concentrates on looking at the supply side of the labor market. For example, Blosfeld et al. (2005) tries to elucidate the impact of globalization and uncertainty in determining the employment stability. From the search and match perspective of the labor market, globalization and technological progress have an impact in this process by allowing job mobility and by providing different employment opportunities for the worker. However, these effects are mitigated due to higher competition and uncertainty which induce people to keep their employments, increasing the job stability and diminishing temporary employment (see also Auer 2005).

The literature in this topic has also analyzed the role of institutional factors of a country. Cebian et al. (2000) and Cahuk et al. (2001) explain how institutional factors or regulations impact the structure of temporary contracts. In the same perspective, Kahn (2007) tries to explain how the employment protection reforms had an effect on temporary employment in Europe. These studies try to establish a relationship between formal institutions and tem-

porary employment.[2] Other studies tried to investigate the effects that collective bargaining (unions) have on temporary employment. Several analyses demonstrate that unions play an important role by generating a negative impact on the use of temporary employees (Uzzi et al., 1998; Olsen et al., 2004).[3]

On the other hand, several factors on the demand side of the labor market also have an effect on temporary employment. Many studies analyze the cost structure of the firms. For instance, Houseman (2001) explain that lower costs[4] are associated with temporary employees, which in the framework of a profit maximizer firm boosts the use of temporary workers. Another interesting perspective from the demand side of the labor market is the one presented by Uzzi et al. (1998). They explain the relationship between market structure and temporary employment, finding an increasing tendency to contract temporary employees when firms are facing growing markets. They argue that hiring temporary workers is a strategy of the firm to reduce costs and be competitive.

There are several perspectives in the economic literature about the effects of labor flexibility on employment. For example, Bentolila et al. (1994) explain the effects of labor flexibility on wages in Sapin, Blanchard et al. (2002) describe the effects on fixed duration contract due to labor reforms in France, and Cahuc et al. (2002) explain the interrelation between the performance of labor markets and temporary employment. Many authors also argue that implementing fixed-term contracts it is not a necessary condition to increase employment. Instead, the implementation of fixed-term contracts may lead to the creation of a dualism[5] in the labor market. (Bentolila et al. 1994, Blanchard et al. 2002, Cahuc et al. 2002).[6]

Many researchers have argued about the importance of fixed-term contracts as a building block on the path towards regular contracts with longer duration. However, there can be mixed employment effects due to the implementation of fixed-term contracts. The introduction of this type of contractual arrangement could raise dualism and limits the effective mechanisms of workers to obtain a permanent employment. Güell (2000) explains the relation between unemployment and fixed-term contracts from an efficiency wage perspective, showing the consequences of implementing fixed-term contracts in an unaltered regulatory framework.[7]

Several analyses in the literature showed how in many OECD countries, temporary employment has systematically gained ground. This type of job structure is currently present in many labor markets, albeit permanent employment is the most desired form of contract. For instance, there is an analysis of the situation of the labor market in Spain and its associated

[2] To further investigate the interplay of institutional factors, it is also important to review the works of Lindbeck et al. (2002), Scarpetta (1996) and Olsen et al. (2004).

[3] Another study that is in concordance with these conclusions is one conducted by Salladerre et al. (2007) for nineteen European countries.

[4] Lower costs imply, for example, the absence of social security or smaller social security benefit packages, precarious systems of incentives and smaller wages. These lower costs for the firms encourage the hiring of temporary workers.

[5] Dualism is a segmentation of the labor market into several distinct sub-labor markets e.g. formal and informal sectors.

[6] Other interesting perspectives in this issue include: Aguirregabiria et al. (1999), Alonso-Borrego et al. (2002), Güell (2000) and Saint-Paul (1996).

[7] Güell (2000) argues that an economy achieves a lower employment equilibrium due to the effects of substituting fixed-term for permanent contracts.

flexible regulatory framework. This study shows that implementing temporary employment is a consequence of economic policies designed to foster labor flexibility and firms' profits instead of employees' security and welfare (Dolado et al. 2002; Güell et al. 2007).

In contrast, other analyses offer an explanation in favor of temporary contracts. For example De Witte et al. (2003) explain the consequences of temporary work in job satisfaction and organizational commitment in four European countries, and Engellande et al. (2005) show that employees that work on a temporary basis tend to provide higher levels of effort compared to permanent employees.[8] These studies suggest that working on a temporary basis does not imply poor working conditions or negative consequences for the employees. They argue that positive results can be obtained by introducing temporary employment schemes.

Some authors have tried to determine the characteristics of individuals who have temporary employment. It has been showed that employees who work under temporary schemes are frequently younger individuals with lower levels of education and limited working experience (see for instance, Russo et al. 1997; Hipple 2001; Valenzuela, 2003). Similar conclusions can be encountered in the analysis conducted by Booth et al. (2000). Likewise, Salladarre et al. (2007) obtained similar results in his analysis of the determinants of temporary employment using the European Social Survey.

There are several analyses that establish a linkage between flexible labor contracts and female labor participation (Casey et al. 2004; Boeri et al. 2005; Hipple 2001; Salladerre et al. 2007). Other studies clarify the positive association between temporary employment and the birth of a child and the effects of changing marital status (Wiens-Tuers et al. 2002; Boeri et al. 2005). In the framework of the unemployment duration, some studies have shown that when unemployment takes place, the future probability of finding an employment of longer duration decays. However, these studies also show that when a person has been unemployed, the probability of finding temporary employment increases (See Chalmers et al. 2000; Guell et al. 2000).[9]

In Latin America and especially in Ecuador there is a lack of analyses to explore the causes and consequences of temporary employment contracts. One analysis for Ecuador is performed by Chavez et al. (2012) who analyze some of the characteristics that would make it possible the existence of the fixed-term employment by branch of activity. However, as Zelaschi (2007) explain, there have been some contributions towards answering some of the questions regarding this area of research in other countries. Therefore, additional research is needed to help scholars and policy makers better characterize temporary employment. This paper tries to contribute to the understanding of temporary employment in the framework of a small developing market economy.

[8] Similar results are exposed by Feldman (2005). Additional relevant studies in this area include Thorsteinson (2003) and Martin et al. (1995).

[9] A good discussion of these perspectives can be found in Booth et al. (2000) and Salladerre et al. (2007).

3 Characterizing the Fluctuations of the Ecuadorian Economy

A functional analysis that describes an economy should not assume ex-ante that a particular system behaves in a certain theoretical manner. Moreover, economic analysis of the framework of Latin-American countries should be careful to consider complex situations of uncertainty and turbulence in these economies. Therefore, an applied econometric analysis have to start analyzing important stylized facts that an economy presents.[10] In the perspective of Taylor (2004), empirical generalizations obtained should be understood as the result of social relations over an empirical framework of social accountability. Moreover, to model social relations and infer the effects of different economic policies, it is of vital importance to analyze the economic data of a country in a holistic way. This section will describe the empirical characteristics of the Ecuadorian economy.

3.1 A brief overview of the Ecuadorian Economy

Commonly it is assumed that the level of real GDP is a good indicator of the quality of life and welfare in an economy. In the context of real business cycles, GDP is the most important component. It is known that in times of high economic growth (booms) living standards of the population improve, there is less unemployment, increased production and also higher consumption. Conversely, when the economy experiences recessionary times conditions deteriorate.

To understand what is behind cyclical movements in the Ecuadorian economy it is necessary to overview some historical and economic framework during the period of analysis. At the beginning of the 1990s, the Ecuadorian economy took advantage of a stable international environment characterized by high oil prices and the increase of exports of non-traditional products. Moreover, the economy benefited from an increase in foreign direct investment which incentivized private activity and the restructuring of the external debt via the Brady Plan. All of these situations are reflected in the increase of GDP during these years.

Nevertheless, this situation was not sustainable and since 1997 national production has shrank because of the powerful effects of the "El Niño phenomenon" which leads to a dramatically reduction in the productivity of many economic sectors. Additionally, the decline in price levels, the insolvency of the financial system and macroeconomic instability affected the performance of the Ecuadorian economy.

The economy of Ecuador at this point was very unstable and in 1998 the incumbent

[10] This vision is in concordance with the emphasis that a structuralism vision of the economy presents, mainly based on realistic 'stylized facts' or empirical generalizations at macro, sectorial and micro level about the economy in the study (see Kaldor, 1963).

government was unable to prevent the rise of interest rates and the restriction of credit. The result was an increase of the fiscal deficit and the deterioration of the trade balance, triggering a high devaluation process of the national currency (see Naranjo 2005). In addition to these issues, the effect of the Asian crisis and the fall of oil prices seriously affected the overall national economy. In 1999, a forced bank holiday was decreed, which at that time sent an image of an unstable financial system and triggered the loss of confidence in the economic agents. Additionally, this crisis was also generated by factors such as the deregulation of the banking system, the influence of powerful groups on technical and political decisions, and greater demands of international and multilateral credit institutions. This situation produced consequences in the real sector of the economy evidenced by the negative effects in employment, consumption, investment and imports.

In 2000, in order to mitigate the effects of the crisis, the government decided to dollarize the economy. At that time, the Central Bank of Ecuador (BCE) fixed the exchange rate to the U.S. dollar at 25,000 sucres.[11] Since then, the newly adopted policies produced a momentary stabilization. After this period of crisis, the economy started to grow again due to the reactivation of production and the recovery of household consumption.

These turbulent scenarios have produced structural changes in the labor market. Many employment polices have in some way affected the stability of the workers and have promoted the creation of several temporary employment contractual arrangements.[12]

It is important to remember that labor flexibility in Ecuador was formally introduced in 1990 with the *Ley de Régimen de Maquila y Contratación Laboral a Tiempo Parcial-Ley 90*[13] and other legal figures for part time work contracts. The aim of this law was the increase of employment by fostering technology transfer and the creation of new technology production sectors. The employees who worked under this new labor structure were considered part of the formal labor sector of the economy, even though they had less protection and job stability. This law, in conjunction with other labor legislation, generated a volatile situation for workers as the employers had the opportunity to terminate contracts with fewer responsibilities in terms of compensation payments. Moreover, in 2000, the Ecuadorian governments issued two laws in order to introduce the dollar as the legal tender and to promote the modernization and privatization of the Ecuadorian economy. These two laws deepened the instability of the of the workers by introducing other types of contracts to hire employees with less liabilities.[14] The reforms introduced in these laws were considered essential as a way to ensure access to

[11] The sucre was the national currency of the Republic of Ecuador between 1884 and 2000 before the dollarization process that took place on January 10th of 2000.

[12] Historically, many governments have proposed more labor flexibility, greater trade liberalization, privatization proposals, financial and exchange rate policies reforms and a tax reform. These have produced several effects in the labor market stability.

[13] "Maquilas" are certain type of manufacturing companies that operate in a free trade zones. See, *Ley de Maquilas y Contratación Laboral a Tiempo Parcial (1990) "Código del Trabajo", Registro Oficial 493, Agosto, Título II* (Maquila Law and Law for Part-time Hiring (1990) "Labor Code", Official Journal 493, August, Title II) for the the body of the law.

[14] These two laws are the: *Ley para la Transformación Económica del Ecuador* (Law for the Economic Transformation of the Ecuador) also known as Trole 1 and *Ley para la Promoción de la Inversión y Participación ciudadana* (Law for the Promotion of Investment and Citizen Participation) also known as Trole 2.

employment and to improve the competitiveness of domestic firms. These reforms contribute to the creation of, for example, the hourly basis contract, temporal contract and the eventual employment contracts. This legislation also affected collective bargaining contracts, employee benefits and changed the regulations for job termination compensations (See Aguiar, 2007).

Another important labor reform that increased labor instability and temporary contracts was the *tercerización* (outsourcing). This figure was initially introduced in the period prior to the dollarization of the economy in 1998, and in the period between 2003 and to 2005 the legislation was complemented and expanded. In Ecuador, this specific form of employing manpower was abused and had dramatic growth, becoming the customary method of many companies to hire personnel.

Since 2003, the path of the Ecuadorian economy, has been characterized by tortuous political instability. However, with controlled inflation due to dollarization, a favorable scenario arose, creating a partial stability that triggered higher investments that foster the industrial and productive sectors. Moreover, since 2007 the economy has enjoyed high oil prices which have raised oil exports, generating a greater contribution of the external sector to the GDP. Also, fiscal policy has become really important because of the inability to manipulate monetary policy. In this context, since 2007 the Ecuadorian economy implemented an aggressive investment policy in education, health and infrastructure. Even though some small crises have hit the country, the economy has maintained stability. Moreover, the government has become a key driver of the economy, fostering many productive activities as a complement to the private sector. This has produced a relatively strong performance of the GDP.

In the context of the labor market, we have seen that in this period, positive legal reforms have improved job quality. In 2006 a law called *Ley de Intermediación Laboral* (Labor Intermediation Act) was enacted. This new regulatory framework produced several changes in the labor market with the aim of increasing employee benefits and imposing stricter controls on firms that use outsourcing as a mean of contracting workers.

The proliferation of legal temporary contracts during the crisis affected the stability of workers, creating discomfort among the population. As a response, in 2008 the National Assembly of Ecuador decided to abolish many types of labor flexibility. This reduced the use of temporary contract workers. However many companies and employers maintain certain type of temporary contracts as they are unable to provide stability to all the workers. In this context, the economic and political history of Ecuador show that growth in labor market opportunities has been based partially on the flexibility of working contracts.[15] For these reasons, the main purpose of this analysis is to examine the impact of different characteristics in determining the probability of obtaining a permanent versus a temporary employment contract.[16] Moreover, we want to determine to what extent these characteristics (demo-

[15] This labor market structure opposes to vision that employee productivity depends on motivation and stability in a job.

[16] In the context of the Ecuadorian legislation, fixed term contracts are those made to meet the labor demand of employers or

graphic, economic activity, region, etc.) impact the probability of have a permanent or temporary employment contract by gender. Finally, it is important to provide some policy recommendations, in order to improve the performance of the Ecuadorian labor market.

3.2 Some Stylized Facts of the Ecuadorian Labor Market

This section provides a brief description of the evolution of some important variables of the Ecuadorian labor market in order to have a better perspective on the performance of some important indicators. In Figure 1, we can observe the overall employment situation in Ecuador obtained from the data provided by the INEC. The lines represent the historical evolution of full employment, underemployment and unemployment. First, we can observe the behavior of full employment. For the period from 2007 to 2013, we observe a positive tendency with an increase from 32.5% in the first quarter of 2007 to 53.27% in the fourth quarter of 2013 and an overall mean of 43.21% for the whole period.[17]

Now, in terms of underemployment, in Figure 1 we can observe that on the period 2007 to 2013 the rate had an average of 47.84%, with a declining tendency from 58.69% in the first quarter of 2007 to 44.84% in the fourth quarter of 2013. Therefore, underemployment is one of the main problems of the Ecuadorian labor market, as many workers are holding part-time jobs despite desiring full-time jobs. Also, many workers are overqualified for the requirements of the jobs that they are performing. Although some reforms in the labor legislation and the dollarization of the economy have brought some economic stability, the overall effect on the quality and stability of the work has not had a decisive effect in the Ecuadorian labor market structure. In Figure 1, we can also see that average unemployment rate for the period 2007 to 2013 is 6.49% and has a declining tendency from 8.8% in the first quarter of 2007 to 5.03% in the fourth quarter of 2013. From Figure 1, we can observe that on average for every 100 Ecuadorians of the economically active population, 6.5 of them could not find a job in 2013.

Additionally, it is important to look the unemployment rate for men and women separately during the period 2007 to 2013. We can observe from Figure 2 that from the first quarter of 2007 to the first quarter of 2011, women are predominantly the group having higher unemployment rates with a mean of 4%, compared to men who have a mean of 3.54% during this period. However, from the second quarter of 2011 to the fourth quarter of 2013, we can see that men tended to have higher unemployment rates with a mean of 2.65% compared

companies (public or private). The duration of this type of contract has to be at least one year and the duties of the work has to be stable or permanent in nature. On the other hand, temporary contracts are those made to meet situational demands of the employers or companies, such as replacing staff who is absent for vacation, sickness, maternity, leave and similar situations. Temporary contracts can also be used to meet increased demand for production or services on usual activities of the employer, in which case the contract may not be longer than one hundred eighty continuous or discontinuous days within a period of three hundred sixty five days. If the circumstance or requirement of the worker's services is repeated for more than two periods of one year, the contract will become seasonal contract which is also a temporary structure.

[17] This percentage represents the number of people with full employment over the economically active population.

to a mean of 2.4 % of women. The implications of this are important in terms of the effect that unemployment has on workers and their families. A long period of unemployment may lead to a decrease in the self-confidence of the unemployed, and may lead them to agree to take temporary jobs with lower wages and sometime in precarious labor environments.

To have a better perspective of the situation of the Ecuadorian labor market, it is also important to compare the Ecuadorian unemployment rate with the unemployment rate of other economies of the Latin American region and important international economies such as United States and Germany. In Figure 3, we observe that in the last years Ecuador has consistently achieved low rates of unemployment compared to other countries. In the period between 2009 and 2013 the unemployment rate of Ecuador is lower than economies such as United States and Germany, and it is also lower than other Latin American countries with the exception of Brazil. However, we can observe that in 2013, Ecuador reached an unemployment rate even lower than Brazil. This supports the idea that Ecuador has improved the situation of its labor market however underemployment and job stability remain as important challenges.[18]

As Figure 4 shows, underemployment tends to be higher for men rather than for women. We also see that there is a decreasing tendency in the underemployment rate and a reduction in the gap between males and females. The underemployment rate from men rose from 32.97% in the first quarter of 2007 to 23.23% in the fourth quarter of 2013. We have a similar situation for women with a reduction of the underemployment rate from 25.72% in the first quarter of 2007 to 20.12% in the fourth quarter of 2013. Furthermore, the overall mean underemployment rate for men between 2007 and 2013 is 25.45% and it is higher compared to the overall mean underemployment rate for women which is 22.94%. Therefore, we observe that in this period, the percentage of Ecuadoreans males employed in the informal sector or who work on an occasional basis is higher than the Ecuadoreans females in the same situation.

From Figure 5, we can see that economically active population (PEA) has constantly risen over period between 2007 and 2013. On the other hand the working age population has a constant pattern over the years.[19] Now, in Figure 6 we see the participation rate, which is the ratio between the economically active population and the working age population. This ratio measures the degree of participation of the population in the labor market. We can observe a decreasing tendency of the participation rate from 62.2% in the first quarter of 2007 to 53.5% in the fourth quarter of 2013. The mean of this ratio for the period comprised between 2007 and 2013 was 57.6%.

In many countries, women are less likely than men to participate in the labor market, i.e. to be employed or actively seeking work. As Figure 7 shows, in Ecuador the participation

[18] Higher rates of underutilization of human capital in the Ecuadorian economy may produce complex economic and social issues, e.g., loss of knowledge and skills, reduction in current and life-long income and job dissatisfaction.

[19] The economically active population is comprised of persons who worked at least 1 hour in the reference week, or if they did not work, were previously working (employed) or those that were available for work or were seeking to work (unemployed) and the working age population comprises all the people that are 10 years old and older.

rates for females are lower than for males. The participation gap between men and women has maintained a slightly divergent tendency with a difference of 14% in the first quarter of 2007 to a gap of 18.6% in the fourth quarter of 2013. Moreover, the overall mean of the gap among men and women is 15.37% for the period between 2007 and 2013.

4 Methodology

The aim of the present analysis is to determine the factors that affect the probability that a person has temporary employment. In this context, it is necessary to explain the necessary econometric tools that help us to model people's behavior and choices. With the help of these models we are going to be able to identify characteristics that influence the probability of obtaining a temporary job.[20]

4.1 Data Sources and Construction of Variables

The data employed for this analysis was obtained from the *Instituto Nacional de Estadística y Censos* (INEC, or National Institute of Statistics and Censuses).[21] For the present analysis the *Encuesta Nacional de Empleo, Desempleo y Subempleo* (ENEMDU, or National Survey on Employment, Unemployment and Underemployment for Ecuador) will be used. The ENEMDU is a household survey conducted quarterly in urban areas. The questionnaire collects personal (characteristic), labor and income information. In this paper, we included only people that are 15 to 65 years old, since the Ecuadorian Law states the minimum age for signing a labor contract is 15 years for all types of work. The age range is also bounded at 65 years old, as this is minimum age at which employees are able to retire. In the sample we considered the last observation of an individual that appears in different time periods. The representative nationwide sample is taken from the second quarter of 2007 to the fourth quarter of 2013. After cleaning the variables and values that are not in the scope of this study, the final sample comprised 428,070 people.

For the present study a set of control variables was selected to take into consideration personal, institutional, occupational and geographical characteristics of the individuals, to verify whether these are crucial when obtaining a temporary contract. The selection of independent variables is based on previous studies that have been conducted in many countries. To determine which independent variables best explain the dependent variable, we carried out a series of sub-models, to avoid having biased statistical results. The identification of

[20] For a more comprehensive description of the models used in this study, see Cameron and Trivedi (2005) and Greene (2012).

[21] This is a governmental institution that provides reliable survey information for the situtation of the Ecuadorian labor market.

temporary employment is based on possible answers to the question about the type of hiring of the worker and complemented ex-ante with the question about the participation in the labor force.

4.2 Discrete Choice and Random Utility Model

To understand the basic framework of discrete choice models it is necessary to understand the idea of random utility models.[22] In this context, the utility comparison for an individual n is not a continuous increase or decrease in utility U, but a discrete comparison. In our case, we have a binary choice, which is obtaining a temporary job or not, and therefore the comparison is U(1; 0) to U(0; 1).

We are not able to observe the utilities of people that choose to work under temporary contracts or other type of contracts. What we are able to observe are the individual choices of job. So, in this setting, the choice has a probabilistic component. Therefore, the alternatives i (in case of having a temporary contract) and j (in case of having a non-temporary contract) for an individual n is given by:

$$P_n(i) = Pr(U_{in} > U_{jn}) \quad and \quad P_n(j) = 1 - P_n(i)$$

As we have individual differences and observational problems, we cannot assume a deterministic relationship between the choices we observe and the values of U. In this context, it is important to distinguish between systematic and random components of U. So we have that:

$$U_{in} = V_{in} + \varepsilon_{in} \quad and \quad U_{jn} = V_{jn} + \varepsilon_{jn}$$

In the previous expression V_{in} represents the systematic or non-random component of the utility of obtaining a temporary job and ε_{in} represents the stochastic component of the utility of obtaining a temporary job. In the same context, V_{jn} represents the systematic or non-random component of the utility of obtaining a non-temporary job and ε_{jn} represents the stochastic component of the utility of obtaining a non-temporary job. Then, we have that:[23]

[22] The treatment of discrete choice modeling, emphasizing the random utility model approach is much like the structure suggested by McFadden (1981).

[23] Let's substitute the last expression into the probability expression: $P_n(i) = Pr[V_{in} + \varepsilon_{in} \geq V_{jn} + \varepsilon_{jn}] = Pr[\varepsilon_{in} - \varepsilon_{jn} \geq V_{jn} - V_{in}] = Pr[\varepsilon_{jn} - \varepsilon_{in} \leq V_{in} - V_{jn}]$. Now, let $\varepsilon_n = \varepsilon_{jn} - \varepsilon_{in}$. Thus: $P_n(i) = Pr[\varepsilon_n \leq V_{in} - V_{jn}]$

$$P_n(i) = Pr[\varepsilon_n \leq V_{in} - V_{jn}]$$

A simple interpretation of this expression is that the probability that an individual n chooses to work under a temporary contract equals the probability that the random advantage of obtaining a non-temporary job over obtaining a temporary job is less than the systematic advantage of obtaining a temporary job over obtaining a non-temporary job.

This derivation is very important to understand discrete variable models. It is possible to intuitively think of the difference between V_{in} and V_{jn} as a weighted combination of the different determinants between working under temporary contract and working under a non-temporary contract. We can map this onto a real line. For instance, assume that $\varepsilon \sim N(0, \sigma^2)$. Now map the probability that ε_n is less than that number:

$$V_{jn} - V_{in} \to \infty,\ Pr[\varepsilon_n \leq V_{in} - V_{jn}] \to 1$$
$$V_{in} - V_{jn} \to -\infty,\ Pr[\varepsilon_n \leq V_{in} - V_{jn}] \to 0$$

This expression basically express the following relationship:

$$\text{If } V_{in} \gg V_{jn},\ P_n(i) \to 1$$
$$\text{If } V_{in} \ll V_{jn},\ P_n(i) \to 0$$

4.3 Linear Probability Model

In figure 8(a), we can observe the decision structure of the linear probability model as well as the Logit and Probit models.[24] For this type of models the variable y has a qualitative meaning with two possible outcomes:

$$y = \begin{cases} 1 & in\ case\ of\ having\ a\ temporary\ contract \\ 0 & in\ case\ of\ having\ a\ non-temporary\ contract \end{cases}$$

So we start with a multiple regression model:

$$y = \beta_0 + \beta_1 x_1 + \ldots + \beta_k x_k + \mu$$

In this specification we have that y is the endogenous variable, and $x_1, \ldots x_k$ are as set of personal, labor, institutional and regional characteristics that influence the contractual

[24] We have based the discussion of Logit and Probit models in the treatment provided in many standard texts such as Greene (2012) or Cameron and Trivedi (2005). Good discussion in the theory and application of these models s can be found in Amemiya (1981, 1985), McFadden (1984) and Maddala (1983).

status of an individual and μ is and identically and independent distributed error. However, it is important to mention that y has a quantitative meaning in thie linear probability model structure. In this context, the discrete dependent variable is treated like a metric variable and therefore we are able to use a common OLS regression methodology.

4.3.1 Parameter interpretation

Since y can take only two values, β_j can be interpreted as a marginal effect of x_j, therefore it holds that:

$$E[y \mid x] = \beta_0 + \beta_1 x_1 + \ldots + \beta_k x_k$$

as well as

$$E[y \mid x] = P[y = 1 \mid x] = 1 * P(y = 1 \mid x) + 0 * (1 - P[y = 1 \mid x])$$

and we can say that response probability corresponds to conditional expectation of y. From the equations above we have that:

$$P[y = 1 \mid x] = \beta_0 + \beta_1 x_1 + \ldots + \beta_k x_k$$

Response probability $p(x) = P[y = 1 \mid x]$ is a linear function of x_j and the same applies to $P[y = 0 \mid x] = 1 = P[y = 1 \mid x]$. Therefore, we have that β_j measures the ceteris paribus change of the response probability based on a one-unit change of x_j:

$$\Delta P[y = 1 \mid x] = \beta_j \Delta x_j$$

In our case we can say that an additional unit in one of the characteristics has a marginal impact β_j on the probability of working under temporary employment, holding everything else constant.

4.3.2 Problems

When applying OLS, $p(x)$ can take on values beyond the interval of $[0, 1]$ and therefore the interpretation as probability is implausible.[25] Also, this model assumes identical increases of probability when exogenous variables increase, independent of the actual level. Moreover, there are also problems of heteroscedasticity and μ_i can take only two values: $-x_i'\beta$ and $1 - x_i'\beta$:

$$E[\mu_i] = P(1 - x_i'\beta) + (1 - P)(-x_i'\beta) = 0$$

[25] Furthermore, we have that linearity is implausible especially at the margins of realizations.

$$Var[\mu_i] = P(1 - x_i'\beta)^2 + (1 - P)(-x_i'\beta)^2$$

$$Var[\mu_i] = P(1 - P) = (x_i'\beta)(1 - x_i'\beta)$$

β_j are unbiased but standard errors are incorrect and therefore t-statistics and F-statistics are not applicable. Consequently, we need to employ other types of models that take into accounts these nonlinearities.

4.4 Logit Model

We have already identified the two main groups of workers (temporary and non-temporary), therefore we need to apply a methodology that reveals the probability of being a temporary employee based in some underlying characteristics. To assess the probability of having a temporary job we are going to use a Logit regression model.[26] This is a type of the binary response model family that help us to correct some of the problems of the linear probability model. In the Logit model the conditional probability has a structure given by:

$$p = \Lambda(x_i'\beta) = \frac{\exp(x_i'\beta)}{1+\exp(x_i'\beta)}$$

and $\Lambda(.)$ is the logistic distribution function and x_i' are the vector of characteristics that influence the contractual status of an individual. Therefore, it holds that:

$$p = \Lambda(z) = \frac{\exp(z)}{1+\exp(z)} = \frac{1}{1+\exp(-z)}$$

In order to find the desired parameters we need to obtain the first order condition of the Logit-Maximum-Likelihood-Estimator:

$$\sum_{i=1}^{N}[y_i - \Lambda(x_i'\beta)]x_i = 0$$

4.4.1 Marginal Effects

In this model, estimated coefficients do not reflect marginal effects on probability as in the linear probability model. Thus, it is useful to define the marginal effect of a change of a regressor on the conditional probability for $y = 1$ as:

$$\frac{\partial P[y=1|x]}{\partial x_{ij}} = F'(x_i'\beta)\beta_j$$

[26] For further discussion see Amemiya (1981, 1985), McFadden (1984) and Maddala (1983).

which depends on the value of the vector of characteristics x_i, like in all non-linear models. If we want to be more specific we can say that marginal effects in the Logit model can easily be defined with the help of the coefficients as:

$$\frac{\partial p_i}{\partial x_{ij}} = p_i(1-p_i)\beta_j \text{ with } p = \Lambda_i = \Lambda(x_i'\beta)$$

For a rough estimate the following definition is helpful to specify that $p_i = \bar{y}$, that is to say $\bar{y}(1-\bar{y})\hat{\beta}_j$.

4.4.2 Odds Ratio

Often the effects of the reggresors are determined by the so-called odds ratio. The odds ratio describes the relative risk of probability for $y = 1$ and $y = 0$. We can say that the Log-odds ratios can be interpreted as semi-elasticities:

$$p = \frac{\exp(x_i'\beta)}{1+\exp(x_i'\beta)}$$

$$\frac{p}{1-p} = \exp(x_i'\beta)$$

$$ln\frac{p}{1-p} = x_i'\beta$$

Consequently, the odds ratio is a relative measures of the effect of one of the characteristics on the probability of obtaining a temporary versus non temporary contract, holding everything else constant.

4.5 Probit Model

To quantify the effect of the set of characteristics that influence the probability of having a temporary employment, a Probit model is also specified. This is another type of binary response model. In the Probit model the conditional probability is:

$$p = \Phi[x_i'\beta] = \int_{-\infty}^{x_i'\beta} \phi(z)dz$$

and $\Phi(z)$ is the distribution function of the standard normal distribution with the density function $\phi(z) = \frac{1}{\sqrt{2\pi}}\exp(\frac{-z^2}{2})$ and x_i' are the vector of characteristics that influence the contractual status of an individual. Again, in order to find the desired parameters we need to obtain the first order condition of the Probit-Maximum-Likelihood-Estimator:

$$\sum_{i=1}^{N} w_i[y_i - \Phi(x_i'\beta)]x_i = 0$$

in this model the weight $w_i = \frac{\phi(x_i'\beta)}{\Phi(x_i'\beta)[1-\Phi(x_i'\beta)]}$ varies over the range of observations.

4.5.1 Marginal Effects

With this type of model we can specify the marginal effect of a change of a regressor on the conditional probability for $y = 1$:

$$\frac{\partial p_i}{\partial x_{ij}} = \phi(x_i'\beta)\beta_j$$

4.6 Model Choice and Model Comparison

The specifications aforementioned are going be estimated in order to compare the three models and decide which one is the best fit to assess the effect of the set of characteristics that influence the probability of having a temporary employment.There are usually only few differences between logit and probit models in empirical applications.The largest differences occur at the margins of the distribution (near probabilities of 0 or 1) but these are not crucial with respect to average marginal effects of a sample. Model comparison is done with confrontation of log-likelihoods and therefore the models produce considerably different coefficients $\hat{\beta}$. Additionally, we are going to the Akaike Information Criterion, or AIC, given by Sakamoto, Ishiguro, and Kitagawa (1987) and the Bayes Information Criterion, or BIC, given by Schwarz (1978). In both measures, smaller values are preferred.

Also, it is important to establish the differences among the goodness of fit. Linear models goodness of fit is measured with the help of R^2:

$$R^2 = 1 - \frac{\sum \mu_i}{\sum (y_i - \bar{y})^2}$$

by minimizing the squared residuals a maximization of goodness of fit is realized. However, using R^2 is difficult in probit and logit models because computing $\hat{\mu}_i = y_i^* - \hat{y_i^*}$ is not possible as y_i^* cannot be observed. We have that maximum likelihood method has a different target function than OLS, which is maximizing the likelihood function rather than minimizing the sum of squared residuals. Therefore a good approach to measure the goodness of fit in this type of models is McFadden's R^2_{MF}, which draws on the value of the log-likelihood function. A standardization is necessary since the absolute value of the log-likelihood is not meaningful:

$$R^2_{MF} = 1 - \frac{\mathcal{L}_N(\hat{\beta})}{\mathcal{L}_N(\overline{y})}$$

$$R^2_{MF} = 1 - \frac{\sum_i \{y_i \ln \hat{p}_i + (1 - y_i) \ln(1 - \hat{p}_i)\}}{N[\bar{y} \ln \bar{y} + (1 - \bar{y}) \ln(1 - \bar{y})}$$

We have that $\mathcal{L}_N(\hat{\beta})$ is the value of the log-likelihood function with ML-estimators of the respective model and $\mathcal{L}_N(\overline{y})$ is the log-likelihood function of the model with only an intercept ($\beta = 0$). Additionally, we are going to use other R-squared measures, such as the R-squared of Cragg-Uhler-Nagelkerke, in order to compare the different specifications.

4.7 Fairlie's Method of Decomposition

To implement this methodology, it is necessary to initially identify the two subsets of workers (temporary and non-temporary). After that we are able to execute various estimation procedures to reveal the differences in the probability of obtaining a temporary contract between men and women. To measure the probability of having temporary employment it is appropriate to estimate a Logit/Probit model for all employed individuals. Subsequently, an evaluation of the model is executed by adding interaction terms. This specification introduces new variables to the previous equation by multiplying each of the factors by the female dummy. After that, we apply the Fairlie decomposition technique for the logit/probit model in order to identify and quantify the contributions of gender differences.

Now, let's start by defining the initial models as:

$$P(Y_i = 1) = F(\beta_0 + X_i\beta_1 + A_i\beta_2 + B_i\beta_3 + \mu)$$

Y_i - is a dichotomous variable that has a value of 1 if the employment is temporary or 0 if the employment is permanent.

β_0, β_1, β_2, β_3 – vectors of coefficients

X_i - set of personal and family characteristics:

- Sex (Female, Male) [Reference category: Female]
- Age (Ranges:15-25, 26-35, 36-45, 46-55, 56-65) [Reference category: 36-45]
- Education (None, Primary, Secondary, Higher non-university, University, Graduate) [Reference category: University]
- Race (Indigenous, White, Black-Afro, Mestizo, Other, Montubio) [Reference category: Mestizo]
- Marital Status (Married, Divorced/Separated, Single) [Reference category: Married]

A_i - set of occupational characteristics:

- Category of Occupation (Government employee, Private employee, Outsourced, Journeyman, Domestic employee) [Reference category: Government employee]
- Duration in a company (Less than one year, More than one year) [Reference category: Less than one year]
- Size of company (Less than 100 employees, More than 100 employees) [Reference category: Less than 100 employees]
- Working hours (Part time, Full time) [Reference category: Full time]

B_i - set of institutional and regional characteristics

- Government Cash Transfer (Yes, No) [Reference category: No]
- Regions (Sierra-Highlands, Coast, Amazon) [Reference category: Sierra-Highlands]
- Area (Urban, Rural) [Reference category: Urban]

The subsequent step is to estimate the aforementioned model specification with additional interaction terms. This new specification introduces additional variables to the previous equation. We are going to generate new terms by multiplying all variables in the previous specification by the dummy for sex D_f (1 for female, 0 for male). Thus, we have the specification as:

$$P(Y_i = 1) = F(\beta_0 + X_i\beta_1 + A_i\beta_2 + B_i\beta_3 + D_f X_i\beta_4 + D_f A_i\beta_6 + D_f B_i\beta_7 + \mu)$$

With this specification, we are able to observe the effects of the Sex dummy in the different factors that have been included in the regression equation.

To examine the gender differentials, a useful method is the Oaxaca-Blinder decomposition method. The Oaxaca (1973) and Blinder (1973) methodology helps decompose the mean differences in some outcome variables between two groups. This decomposition permits us to identify a part which is due to differences in observable characteristics (explained differential) and another part which is due to differences in unobservable characteristics (unexplained differential). However, this technique of Blinder (1973) and Oaxaca (1973) involves coefficient estimates from linear regressions only and it is not possible to apply in this case, as our outcome variable is binary. As we a have a logit/probit regression model with a binary dependent variable, it is necessary to employ another type of methodology. Fairlie (1999, 2005) and Yun (2004) have proposed useful methodologies that help to obtain a detailed decomposition when we are dealing with limited dependent variable models. Therefore, in the present analysis, Fairlie's method of decomposing for logit/probit models is used to obtain the differences among male and female. By applying this methodology, it is possible to disentangle the gender differences of temporary versus permanent employment. The specification of the Fairlie decomposition is given by:

$$\overline{Y}_F - \overline{Y}_M = (\sum_{i=1}^{N_f} \frac{F(X_i^f \beta^f)}{N_f} - \sum_{i=1}^{N_m} \frac{F(X_i^m \beta^m)}{N_m}) + (\sum_{i=1}^{N_f} \frac{F(X_i^f \beta^f)}{N_f} - \sum_{i=1}^{N_f} \frac{F(X_i^f \beta^f)}{N_f})$$

F - cumulative distribution function from logistic distribution (logit model) or standard normal distribution (probit model)

X - row vector of independent variables

β - vector of coefficient estimates for Sex (Male, Female).

4.8 Selection Bias in Binary Choice Models

In the present study, we want to know how several characteristics affect the likelihood of success of obtaining a temporary contract. The main problem is that information about the contractual situations is only available for the people who have an employment.

In order to solve this selection problem,[27] we are going to first use a multinomial logit model, which takes into consideration not only the people who are working, but also the people who are not working. Also a useful tool, when we are dealing with selection, is the Heckman model (see Heckman, 1979). However, this type of model has the limitation that the outcome equation should involve a continuous dependent variable. In the present study, we are interested in estimating an outcome equation that involves a dichotomous dependent variable. In this context, we deal with a probit selection equation and a probit outcome equation. Therefore, a bivariate probit model framework is an appropriate methodology in this case.

4.8.1 Multinomial Logit

In figure 8(b), we can observe the decision structure of the multinomial logit model.[28] In this case we infer that the decision of the person n that choose a labor status alternative j is described by the utility equation,

$$U_{nj} = V_{nj} + \mu_{nj}$$

The systematic component of the utility function is given as,

$$V_{nj} = z_n \gamma_j$$

Therefore,

$$U_{nj} = z_n \gamma_j + \mu_{nj}$$

In the previous equation, γ_j is a vector of alternative-specific parameters. So, in this type of specification the effect of the regressors will vary across all the labor status choices.

[27] There is a variety of literature on models from selected samples. Good treatments are provided by Maddala (1983) and Gouri'eroux (2000), Amemiya(1984, 1985) and Greene (2012).

[28] Amemiya (1981, 1985), Maddala (1983), Greene (2012), Ben-Akiva and Lerman (1985) and Train (1986) provide theory and applications to understand the structure of multinomial models.

Consequently, we have that a person n that chooses a temporary contract alternative i, has a probability:

$$P_{ni} = \frac{exp\{V_{ni}\}}{\sum_j exp\{V_{nj}\}}$$

$$P_{ni} = \frac{exp\{z_n\gamma_i\}}{\sum_j exp\{z_n\gamma_j\}}$$

As in previous models this can be estimated using a log likelihood estimation process.

4.8.2 Bivariate Probit

In this type of model, we have a structure which is composed of two separate probit models with correlated disturbances.[29] This model, has an structure similar to the seemingly unrelated regression models (SUR).[30]

In this context, we have two dichotomous dependent variables. By applying this type of methodology we are basically trying to model two interrelated decisions of a person. In the first stage we are interested in modeling if a person participates or not in the labor market and in the second stage we are interested in whether the person chooses a temporary contract or not. Moreover, we employ this type of model because we assume that the two decisions are interrelated. In figure 8(c), we can observe the decision structure of the bivariate probit model. Thus, the model is given by

$$y_1^* = x_1\beta_1 + \mu_1$$
$$y_2^* = x_2\beta_2 + \mu_2$$

where the expressions y_1^* and y_2^* are unobservable latent variables that are linked to the binary dependent variables y_1 and y_2 by

$$y_1 = \begin{cases} 1 & if\ y_1^* > 0 \\ 0 & if\ y_1^* \leq 0 \end{cases} \quad and \quad y_2 = \begin{cases} 1 & if\ y_2^* > 0 \\ 0 & if\ y_2^* \leq 0 \end{cases}$$

In this framework, it is important to note that if the errors are independent among the two probit models, then it is possible to estimate these models separately. However, in our case, we expect to have a covariance different from zero and therefore we will have that

$$\mu_{1i} = \eta_i + \epsilon_{1i}$$

[29] For further discussion of this model see Greene (2012) and Cameron and Trivedi (2005).
[30] For a discussion of Seemingly Unrelated Regression models (SUR) see chapter 10 of Greene (2012).

$$\mu_{2i} = \eta_i + \epsilon_{2i}$$

This means that in each of the models the error is composed of an element ϵ_i exclusive to that model and joint component η_i. As we are using a bivariate probit specification we assume that μ_{ji}, ϵ_{ji} and η_i for $j = 1, 2$, are normally distributed. This implies that μ_{ji} is influenced partially by η_i, which indicates that μ_{1i} and μ_{2i} are correlated. In this context, we want to estimate the joint probability of y_{1i} and y_{2i}.[31] So

$$\begin{aligned} P(y_{1i} = 1) &= P(\mu_{1i} > -x_{1i}^{'}\beta) \\ &= P(\epsilon_{1i} + \eta_i > -x_{1i}^{'}\beta) \end{aligned}$$

and

$$\begin{aligned} P(y_{2i} = 1) &= P(\mu_{2i} > -x_{2i}^{'}\beta_2) \\ &= P(\epsilon_{2i} + \eta_i > -x_{2i}^{'}\beta_2) \end{aligned}$$

The joint probability of several random variables is the product of their marginal probabilities, if these random variables are independent. However, in our case the two random variables are not independent and therefore we need to find the joint probabilities for non-independent events. Thus,

$$\begin{aligned} P(y_1 = 1, y_2 = 1) &= P(y_1 = 1|y_2 = 1) \times P(y_2 = 1) \\ &= P(y_1 = 1) \times P(y_2 = 1|y_1 = 1) \end{aligned}$$

In order to obtain this probability we will use a bivariate normal distribution.[32] For the estimation of the bivariate probit model we are going to assume that the errors are i.i.d. following a standard bivariate normal distribution with correlation ρ (which can be also expressed as $\mu_1, \mu_2 \sim \phi_2(0, 0, 1, 1, \rho)$).[33]

This methodological structure helps us to obtain the necessary probabilities, as for example, the probability of going to the labor market and having a temporary employment,

[31] In the case in which $\rho = 0$, we can estimate independently the two probit equations and obtain consistent results. But, when we have a $\rho \neq 0$, it is better to estimate the two equation jointly, as it is more efficient.

[32] The bivariate normal distribution is $\phi_2 = \phi(\mu_1, \mu_2) = \frac{1}{2\pi\sigma_{\mu_1}\sigma_{\mu_2}\sqrt{1-\rho^2}} exp[-\frac{1}{2}(\frac{\mu_1^2+\mu_2^2-2\rho\mu_1\mu_2}{1-\rho^2})]$, where the correlation coefficient ρ represents the degree of association of the errors μ_1 and μ_2. Their joint cdf is given by $\Phi_2 = \Phi(\mu_1, \mu_2) = \int_{\mu_1}\int_{\mu_2}\phi(\mu_1, \mu_2, \rho)d\mu_1 d\mu_2$

[33] Consequently, $E[\mu_1|x_1, x_2] = E[\mu_2|x_1, x_2] = 0; Cov[\mu_1|x_1, x_2] = Cov[\mu_2|x_1, x_2] = 0; Cov[\mu_1, \mu_2|x_1, x_2] = \rho$

$$P(y_{1i}=1, y_{2i}=1) = \int_{-\infty}^{\mu_{1i}} \int_{-\infty}^{\mu_{2i}} \phi_2(x_1\beta_1, x_2\beta_2; \rho) d\mu_1 d\mu_2$$
$$= \Phi(x_1\beta_1, x_2\beta_2; \rho)$$

Similarly as in the previous models, in order to find the desired parameter, we need to obtain the Maximum-Likelihood-Estimator. In the case of the bivariate probit model, the log-likelihood is a sum across the four possible combinations of y1 and y2 multiplied by their associated probabilities. Therefore, the the log-likelihood for the bivariate probit model is given by

$$lnL = \sum_{i=1}^{N} \{y_{1i}y_{2i}\Phi_2(x_1\beta_1, x_2\beta_2; \rho) + y_{1i}(1-y_{2i})ln[\Phi(x_1\beta_1) - \Phi_2(x_1\beta_1, x_2\beta_2; \rho)]$$
$$+(1-y_{1i})y_{2i}ln[\Phi(x_2\beta_2) - \Phi_2(x_1\beta_1, x_2\beta_2; \rho)$$
$$+(1-y_{1i})(1-y_{2i})ln[1 - \Phi(x_1\beta_1) - \Phi(x_2\beta_2) - \Phi_2(x_1\beta_1, x_2\beta_2; \rho)]$$

4.8.3 Marginal Effects

Again, as in previous models, in the bivariate probit case, it is possible to obtain the marginal effect of a change of a regressor. However, in the case of a bivariate probit model, we are interested in the conditional mean function,

$$E[y_1|y_2=1] = P(y_1=1|y_2=1) = \frac{P(y_1=1, y_2=1)}{P(y_2=1)}$$
$$= \frac{\Phi_2(x_1\beta_1, x_2\beta_2; \rho)}{\Phi(x_2\beta_2)}$$

And then we can take the derivative of this expression with respect to any of the regressors in order to get the marginal effects.

5 Results of the model

5.1 Descriptive Analysis

It is important to perform an exploratory analysis to determine the structure and quality of the database. Here, we present the final results of the main variables used for the estimation process. We start the analysis by exploring the main features of the variables employed in the study. This will provide a good insight into the situation of the Ecuadorian labor market. Several tables are presented in order to show the distributional characteristics, as well as, the structure of important variables that affect a person's contractual situation. By

examining these descriptive statistics, we are able to identify some of the features related to the probability of having a temporary versus other type of contractual situations. Before we start the analysis we need to define some important categories that are going to be used. The category "other" refers to people who do not define their type of contract in the survey, however, they are working in the formal sector, informal sector or in a non-classified activity. The category non-working refers to anyone who does not have a job, have actively looked for a job in the past weeks, and are currently available for work. On the other hand, out of the labor force refers to anyone who is not classified by the National Institute of Statistics and Census (INEC) as members of the labor force. This category is largely comprised of several segments of the population, such as young (students), elderly (retired), homemakers, etc. It also includes others who are either unwilling or unable to engage in productive activities.

5.1.1 Personal Characteristics

In this subset of characteristics, the following variables are included: Sex, Age, Marital Status, Education and Race.

In Table 1, it is observable that among men, temporary employment represents 31.52% and is the most common way of contractual situation. In the case of women, The category out of the labor force represents 46.99% and is the most common contractual situation. Moreover, men tend to have more temporary contracts (31.52%) than permanent contracts (17.06%). In the case of women, we can see that they tend to be more concentrated in permanent jobs (11.80%) compared to temporary jobs (11.72%). However, women tend to have higher non-working contractual situation compared to men with 52.35% versus 47.65% for men. Also, it is important to note that out of the labor force male population (26.06) is significantly lower than out of the labor force female population (73.94%). From Table 1, we can also observe that temporary contracts are concentrated more among males (71.82%) in relation to females (28.18%).

From Table 2, we see that among people in the age range 15-25, out of the labor force is the most common contractual condition with 51.32%. In the age range 26-35 temporary employment is the predominant contractual condition with 28.78% and in the age range 36-45 (36%), 46-55 (40.59%) and 56+ (41.97%), we see that "other" is the predominant contractual condition. Now, if we focus on temporary and permanent contracts, we can see that permanent contracts are concentrated among the age ranges of 26-35 and 36-45, with 27.81% and 24.50%, respectively. Conversely, we can see that temporary employment is concentrated more among the age groups of 15-25 and 26-35 with 34.15% and 26.57%, correspondingly. It is important to note that non-working (51.47%) and out of the labor force (52.96%) categories are mainly concentrated in the age range 15-25.

Analyzing the marital status of the individuals, we can infer that among married and separated people, there are a concentration of "other" contractual situation with 33.99% and 35.69%, respectively. Among single persons the most common contractual situation is out of the labor force with 42.75%. Furthermore, permanent contracts are concentrated among the people who are married, with a share of 60.24%. A similar situation is observed for temporary contracts, as married people represent 49.75% and single people represent 40.58%.

Examining Table 4, it is observable that people with none, basic and secondary tend to be concentrated among "other" and out of the labor force. On the other hand, people with higher no university, university and graduate studies tend to have a permanent contractual condition with 35.94%, 32.40% and 65.38%, correspondingly. Moreover, it is also important to mention that among the people who have a permanent contract, there is tendency to have a university education (39.02%). Among the people with temporary contracts, there is a concentration of people that have basic and secondary education, at 47.04% and 33.51%, respectively.

Variables such as race are considered very important for explaining temporary contract status. It is observable from Table 5 that Indigenous populationtend tend to be concentrated in "other" as their contractual situation. All the other racial groups tend to be concentrated in out of the labor force and "other" as their contractual situation. We can see from table 5 that only 6.23% of the Indigenous people have a permanent employment and 18.42% have temporary employment. Mestizos tend to have more temporary (21.85%) than permanent (15.69%) contracts. We have a similar situation for White people, with 15.04% having permanent contracts versus 21.13% having temporary contracts. Montubio people tend to have more temporary contracts than permanent contracts. In the case of Black people we can observe that they tend to have more temporary contracts with 27.5% compared to 8.8% that have permanent jobs. Another important feature is that some people tend to define themselves as "other" in terms of their race. This category, which represents 53.65% of the total, is characterized by a high heterogeneity of races. Moreover, we can observe from Table 5 that an important percentage of all people from all races are out of the labor force.

5.1.2 Occupational Characteristics

From Table 6 we can observe that private sector and self-employment are the most common sectors where people tend to work with 29.01% and 28.33%. In terms of temporary and permanent employment, it is observable from table 6 that government employees as well as private employees tend to have permanent contracts with 71.83% and 36.17%, respectively. In contrast, outsourced and journeyman employees tend to have temporary employments

with 68.02% and 95.24%, correspondingly. Table 6 also shows that patrono,[34] self-employed and unpaid workers workers, tend be highly concentrated in "other" category with 99.20%, 98.79% and 99.60%, respectively. Furthermore, domestic employees tend to have temporary contracts (59.14%) and many people in the non-working group are private employees (56.18%).

By analyzing the years of career services in Table 7, we can see that permanent contracts are less concentrated in the people that have an experience of less than one year with 14.67%. In the case of temporary contracts the difference is not as big as in the population with permanent employment, as we can see that people with experience of more than one year represent 64.34%. Now, if we observe the category "other", we see that the people in this group tend to be concentrated in more than one year of experience with 87.75%. The non-working and out of the labor force groups reported in Table 7 did not provide information about this question.

In Table 8, we observe that size of the company is an influential characteristic. We see that companies with more than 100 employees (large companies) tend to offer permanent contracts (54.36%). A different situation is observable for people that work in companies with less than 100 employees (small companies), as this group represent the 82.51% of the total population of employees that works on temporary jobs. Additionally, we can see from Table 8 that people that work under "other" contractual status tend to be people working in companies with less than 100 employees (99.96%).

By analyzing working hours in Table 9, we can see that permanent contracts are less concentrated in the people who have a part time employment (6.46%). In the case of temporary contracts, we can observe a similar situation, as people who work part time represent only the 21.58%. Now, if we observe the category "other", people in this group tend to be concentrated full time employment with 62.28%. The non-working and out of the labor force groups reported in the table did not provide information about this question.

5.1.3 Institutional and Regional Characteristics

We also have to analyze if a cash transfer from the government influences the probability of having a temporary contract. If we look the population under permanent contracts, we see that the majority (97.73%) do not receive the benefit of the government cash transfer. A similar situation is true for the people with temporary contracts (93.51%). Moreover, we can see that people who are receiving cash transfer benefits are concentrated among the groups "other" and out of the labor, at 33.49% and 49.42%, respectively.

[34] Patrono is a particular type of employer that offers a private service job to a worker, under his authority, for a fee or remuneration.

We also take into consideration regional difference as a variable that could have an important influence in the probability of having a temporary contract. From Table 11 we can observe that permanent contracts are concentrated in the Sierra/Highlands area with 60.68%. In relation to temporary contracts, we can see that Coast area is where there is more concentration of this type of contract with 50.63%. People out of the labor force are almost equally divided among the Sierra/Highlands and Coast with 46.95% and 48.23%. Also, in the Amazon area the "other" contractual situation is the most common status with 33.32%.

Finally, we analyze the difference between rural and urban areas as a determinant of the probability of having a temporary contract. In Table 12 we see that permanent contracts are concentrated in urban areas with 83.2%. Temporary contracts are more equally divided among rural (43.66%) and urban (56.34%) areas. "Other" is also divided among rural and urban areas with 45.03% and 54.97%. Non-working and out of the labor force populations are mainly concentrated in urban areas, at 77.67% and 63.03%, respectively.

5.2 Results of the Estimated Models

5.2.1 Model Comparison and Logit Specification

In regression Table 13, we can observe the three models that have been used to estimate the probability of a worker to have a temporary employment. The results show that the majority of the variables included are statistically significant. Moreover, the three models present similar directions of the effects. However, as it has been explained in the methodology section, the linear probability model generates some statistical problems and therefore is not the best fit for this type of data.[35] In relation to the logit and probit models, the results are quite similar and we have analyzed both models under various statistical criterions,[36] in order to select the appropriate model. Additionally, each variable has been examined to decide the most appropriate regressors that have to be included in the model. Based in these procedures we have concluded that the logit model is the most accurate specification for the estimation of the probability of having a temporary contract. This is also in concordance with many applied studies that have performed similar methodologies.

The logit model specification in Table 14 takes into consideration only the people who are in the labor market and are employed. This model shows significant differences in the probability of having a temporary versus a permanent contract. Among the most important variables that influence this probability we have personal characteristics such as sex, age, marital status, level of education, race, labor characteristics such as category of occupation,

[35] In the linear probability model, the standard errors are not precise and therefore are not useful in testing accurately the significance of the parameter estimates.

[36] The criterions used are: R^2_{MF}, $R^2_{snell\,and\,cox}$, Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC).

duration in a company, size of a company, working hours, institutional characteristics such as government cash transfers and geographical characteristics such as geographic region and area.

According to the model, the probability of being a temporary employee is higher for males than for females. Being a young person (between 15 and 35 years of age) who has a low level of education increases the probability of having a temporary contract. Not having a spouse increases the possibility of temporary employment. Being an indigenous person who receives the government cash transfer increases the likelihood for temporary contracts. Being an outsourced or journeyman employee as well as working part time increases the chances of having temporary employment. Working more than one year in a large company (more than 100 employees) decreases the possibility of obtaining a temporary contract. Living in a rural area in the Coast or Amazon region increases the probability of being in a temporary job.

It was observable from Table 13 that all the variables are statistically significant at the 95% confidence level. However, it should be noted that certain categories of these these variables are not statistically significant. To check if the model is globally meaningful, we have performed the logarithm of likelihood ratio test, which gives a p-value that is close to zero, indicating that the full model with all the covariates improves the fit significantly compared with a model without any predictor. Moreover, it is important to mention that the result are highly plausible, based in the reality of the Ecuadorian labor market structure, as we will explain later. Finally, we have also analyzed various R-squared measures (The R Square of Cragg-Uhler-Nagelkerke and McFaddens R square) which have values of 0.52 and 0.36, respectively, indicating that 52% and 36% of the variation in the dependent variable is explained by the variables included in the model. The econometric theory suggests that in this type of models, these obtained R square values represent a good fit of the estimated model.

For the interpretation of the results, we have selected the reference category to be a woman, with an age between 36 and 45 years old and with university education. This woman is married or cohabitating and working in an institution more than one year. Moreover, she is a government employee, with full-time job in an institution with more than 100 workers. Also, this woman does not receive a government cash transfer and lives in an urban area in the Sierra region. Results of the regression suggest that being a Male versus being a Female increase the odds of having a temporary contract by a factor of 1.19. This shows an interesting feature of the Ecuadorian labor market in which women have a higher probability of job stability. Also, people in the age range between 15 to 25 years and 26 to 35 years have high odds of having a permanent contract by a factor of 1.42 and 1.26, respectively, compared to people in the age range between 36 to 45 years. This could be because young people face

particular difficulties in entering the labor market and tend to be hired under temporary contracts as they are less experienced or skilled. However, as the worker becomes older, she becomes more qualified and knowledgeable and therefore the chance of having a temporary employment decreases. From regression Table 14, we can infer that divorced/separated or single people tend to have a higher probability of having a temporary contract compared to people that are married by a factor of 1.24 and 1.18, respectively. Also, if an individual has not attained any education or has only basic or secondary education the odds of having a temporary versus permanent employment increases by a factor of 2.86, 2.09 and 1.39, correspondingly. This shows that people employees with less investment in human capital tend to increase the probability of become a temporary worker.

Another important feature of the model is that if a person is belonging to the indigenous racial subset, the odds of having a temporary versus permanent contract increases by a factor of 1.31. As well, it is important to mention that an individual that works as an outsourced or journeyman has a positive effect in the odds of having a temporary versus permanent contract by factors of 3.29 and 38.93, respectively. All these features could be explained by the fact that temporary employment is very likely to be present in economic sectors in which simple and basic tasks are performed, such as those required by agricultural crops, livestock breeding, fishing, hunting, construction industry and therefore only require the use of hand tools and often considerable physical effort.

Table 14 also shows that if a person is working in an institution more than one year the odds of having a temporary versus permanent employment contract is decreased by a factor of 0.23. As we mentioned before, people that have gained experience and have been working in an institution for a while tend to have higher stability and therefore the likelihood of a having a permanent contract is higher. Moreover, if an individual has a part-time job the odds of having a temporary versus permanent contract increases and by a factor of 2.49 and if works within an institution with more than 100 workers the odds of having a temporary employment decreases by a factor of 0.44. This might be because large institutions and companies often tend to offer permanent contracts in comparison to small and middle institutions or companies that want to minimize cost and try to hire workers under temporary contracts. Furthermore, it is reasonable that people that tend to work full-time are more likely to have a permanent contract in comparison to the people that have only part-time jobs. An additional interesting feature of this model is that a person who receives the government cash transfer also has higher odds of having a temporary versus permanent employment by a factor of 1.67. The reason is that people who receive this cash transfer are mainly poor and therefore are usually working in sectors in which there is lack of job stability. Finally, it is important to mention that if a person lives in the Coast or the Amazon region as well as in a rural area, the odds of having a temporary versus permanent

contract decreases by a factor of 1.92, 1.43 and 1.29 respectively. This shows the disparities in the quality of employment among the regions of Ecuador.

5.2.2 Logit Model with Sex Interaction Terms

In this analysis, we use a logistic regression with interaction terms for female. The aim of estimating a model with interaction terms is to measure the effect of being a female in all the other personal, labor, institutional and regional characteristics that affect the probability of having a temporary contract.

The results in Table 15 are consistent with the results obtained in the previous logit specification without interaction terms. We observe that according to the logit model with interaction terms, the probability of being a temporary employee remains higher for males compared to females and the size of the effect is higher. Also, it is observable from Table 15 that factors such as being single, having secondary education, being in the racial group "other", work in the government or being a domestic employee, the length in a company, the size of a company, working part time and living in a rural area have different effects for men and women in the probability of obtaining a temporary employment.

5.2.3 Fairlie Decomposition

Subsequently, we performed a Fairlie detailed decomposition. With this method we decomposed the differentials in the probability of having a temporary contract between men and women and see the contributions of each of the personal, labor, institutional and regional characteristics in explaining the gender difference. From the results of the decomposition in Table 16, we can observe that our model measures a total difference of 0.15 and a gender difference of 0.082. This tell us that the decomposition performed show that 8.2% of the gender gap in temporary employment is explained by all of the included characteristics in the model. From the results we see that category of occupation account for 7.48% of the men/women gap in the probability of having a temporary contract. Also, one of the largest factors contributing to this gender difference is education (2.19%). Other significant factors that contribute to explain the gender differences are duration in a company (-1.65%), working hours (-1.08%), size of the company (0.83%) as well as living in a rural or urban area (0.54%). Also, region (Highlands, Coast or Amazon) and government cash transfers explain 0.48% and -0.39% of the men/women gap in the probability of having a temporary employment, correspondingly. Marital status explains a small portion of the gender gap (-0.28%) and race have almost no influence in explaining the gender gap (0.02%).

5.2.4 Multinomial Logit

In order to take into consideration heterogeneity and selection issues, we have estimated a multinomial logit model for males and females. The results in Table 17 show that women are more likely to have permanent employment (compared to temporary employment) when they are older (more than 35 years old), and have a higher educational attainment (Graduate studies). These are the only two factors that are statistically significant for this category. Now, if we look at "other" category, females have higher probability of working under this type of contracts (compared to working under temporary contracts) when they are older (more than 35 years old), have less educational attainment (None, Basic, Secondary), are Indigenous or Montubio and when they live in rural areas. From table 17, we can also observe that women have higher possibility to be in the not-working category (compared to having a temporary employment) when they are younger, however the effect diminishes and it is statistically significant for all age groups, except the age range between 56 and 65 years old. Also, women have a higher possibility to be in the not-working category if they have secondary education and if the live the Coast region of the country. Finally, females are more likely to be out of the labor force (compared to working under temporary contracts) when they are in the ages groups 15-25, 26-35 and 56-65, with a higher impact when they are older. This shows the fact that in the out of the labor force group there are young people studying or voluntarily not working and older people leaving the labor force. Furthermore, women are more likely to be out of the labor force if they have less educational attainment (None, Basic, Secondary), are White, "Other" or Montubio, receive the government cash transfer, live in the Coast and Amazon region and if they live in a rural area.

Table 18 shows the results of the multinomial regression for males, which produced slightly different results than the previous regression for women. The results in Table 18 indicate that men are more likely to have permanent employment (compared to temporary employment) when they are older (more than 35 years old), and have a higher educational attainment (Higher non-University and Graduate studies). As before, these are the only two factors that are statistically significant for this category of occupation. Now, if we look at the "Other" category, males have higher probability of working under this type of contracts (compared to working under temporary contracts) when they are older (more than 35 years old), are Indigenous or Montubio, when they receive the government cash transfer and when they live in the Amazon region. Also, from Table 18, we can see that men have a higher possibility to be in the not working category (compared to having a temporary employment) when they are in the age ranges 15-25, 26-35 and 56-65, are separated or single and when they are White or Montubio. Lastly, males are more likely to be out of the labor force (compared to working under temporary contracts) when they are in the ages groups 15-25,

26-35 and 56-65, again with a higher impact when they are older. Moreover, men are more likely to be out of the labor force if they are separated or single, are Indigenous, White, "Other" or Montubio and if they receive the government cash transfer.

5.2.5 Bivariate Probit

The bivariate probit model assumes that people make two sequential decisions. The first is whether to participate in the labor market (work) or not and the second is which type of contract to accept. From Table 19, we can see the results of the likelihood ratio test which rejects the null hypothesis that $\rho = 0$ at the 1% level. This provides evidence in favor of joint normality between the error terms from the initial participation decision and the subsequent contractual decisions, thereby suggesting that the bivariate probit may be an appropriate specification. In Table 19, the bivariate probit coefficients represent the effect of several characteristics on the decision to participate in the labor market or not and the decision of working under a temporary or non-temporary contract, respectively. We can observe that men tend to have higher probability to participate and work under temporary contracts compared to women. Being in the age ranges 15-25, 26-35 and 56-65, decreases the possibility of participation in the labor force, and people in the age ranges 15-25 and 26-35 have lower possibilities to have a temporary contract. Therefore, we can see that younger people tend to participate less in the labor force and if they participate, they tend to have higher probability to work under temporary basis.

As Table 19 shows, separated and single people tend to have lower probability to participate in the labor force and if they participate they have higher probability to obtain a temporary employment. People with lower educational attainment (None, Basic) and with very high educational attainment (Graduate) are more likely to participate in the labor force. However, people with lower education (None, Basic and Secondary) are more likely to have a temporary job. This shows that the labor market demands workers with low skills to perform physical or basic jobs in sectors such as agriculture, mining or fishery and people with high skills to perform more intellectual activities in sectors such as services. However, people who perform these low-skilled jobs are prone to obtain a temporary job. We also observe from Table 19 that people who identify themselves as White have lower probability of participation and people who identify themselves as Indigenous or "Other" have higher probability to work under temporary contracts. People who are private, outsourced, journeyman and domestic employee are less likely to participate, and if they participate the have higher probability to have a temporary employment. As expected, people receiving Government cash transfers have lower probability of participation and higher probability of having a temporary job. Living in the Coast region decreases the probability to participate

and increases the likelihood of obtaining a temporary employment. Similarly, people living in the Amazon region are more likely to work under temporary contract and people living in a rural area are more likely to participate however people in this area tend to have higher probability to obtain a temporary job.

6 Conclusion and Policy Implications

Using data from the Survey of Employment, Unemployment and Underemployment from the National Institute of Statistics and Censuses of Ecuador and the application of several econometric models, the present analysis aims to contribute to the understanding of some characteristics that influence the probability of obtaining a temporary employment in the Ecuadorian labor market. It is important to mention that the results of all the models, used to explain the determinants of temporary employment, show similar and consistent results.

My analysis indicates that temporary employment in Ecuador is a phenomenon associated with the characteristics of the person, the geographical region where an individual lives and other institutional and occupational characteristics. Recalling the main results, being male tends to increase the probability to be a temporary employee in the Ecuadorian labor market. Factors such as being young, have a low educational attainment and certain marital status and race categories are the personal characteristics that increase the likelihood of obtaining a temporary employment contract. Occupational features such as being an outsourced or journeyman worker, working in an institution less than one year and having a part-time job influence positively the odds of obtaining a temporary contract. Additional, institutional characteristics such as the benefits from the Government cash transfers and regional characteristics such as living in a rural area or in the Coast and Amazon region increase the possibility of having a temporary job. It has also been determined that the most important characteristics that explain gender differences are the category of occupation, education and the length and size of the company where the person works. Therefore these models have increased our knowledge about some of the behaviors of people within the Ecuadorian labor market, helping us to understand what determines temporary contracts.

Based in the analysis exposed we can derive policy recommendations that produce practical contributions in the performance of the Ecuadorian labor market. Consequently,

- I suggest that policies have to be focused in giving opportunities to Indigenous people outside traditional agricultural, construction and low-skilled sectors. It is imperative to help Indigenous population to be formally employed in the labor market.

- It is important to discuss and implement public policies that stimulate the creation of opportunities for the young unexperienced people that want to enter in the labor force.
- It is necessary to keep fostering educational policies that increase the education and human capital of the population in order to reduce labor instability. Additionally, it is important keep regulating the labor market for outsourced and journeymen workers.
- It will be positive to foster (private/public) investment in the Amazon Region and Coast Region to create more job opportunities.

The results of my analysis to some extent confirms the association between certain individual, institutional and regional characteristics and the likelihood of obtaining a temporary contract. The aim of my research is to create more public, politic and academic debate on this important issue. This implies that there is a lot of room for further investigation that may reveal important features of the employment situation in the Ecuadorian labor market.

7 Future Research and Limitations

While this study attempted to uncover what factors have made a person more likely to be employed in a temporary basis, it was limited by data and time constraints. Future research has the potential to improve model specifications by using variables that help to account for the selection into the labor force (for example the number of children obtained from the household roster). Future studies on this topic should try to account for the heterogeneity in some of the comparison groups. It is also important to mention that in this study we have informally tested for endogeneity. We did not find serious problems in the result exposed. Endogenity or non-orthogonality in discrete choice models happens when the systematic part of the utility is correlated with the error term. A useful methodology to address this problem is the control function[37] method (See Greene, 2012; Cameron and Trivedi, 2005). However, one disadvantage is that it involves finding instrumental variables, which due to data constrains, we were unable to find in the present study. Finally, following recent advances in econometric methods and statistical packages, it might be possible to perform a two-level multinomial logistic regression that can be implemented using generalized structural equation modeling and see if this specification fit well the data and model correctly the behavior of the people in the Ecuadorian labor market.

[37] The control function method consists in the construction of a function that accounts for the endogenous part of the error term which is then included as an additional variable in the model.

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Table 1: Type of Employment Situation by Sex

Working Decision	Male	Female	Total
Permanent	35,535	25,940	61,475
	57.80%	42.20%	100%
	17.06%	11.80%	14.36%
Temporary	65,648	25,759	91,407
	71.82%	28.18%	100%
	31.52%	11.72%	21.35%
Other	63,707	57,106	120,813
	52.73%	47.27%	100%
	30.59%	25.98%	28.22%
Non-Working	7,015	7,708	14,723
	47.65%	52.35%	100%
	3.37%	3.51%	3.44%
Out of the labor force	36,388	103,264	139,652
	26.06%	73.94%	100%
	17.47%	46.99%	32.62%
Total	208,293	219,777	428,070
	48.66%	51.34%	100%
	100%	100%	100%

Source: ENEMDU (INEC)

Table 2: Type of Employment Situation by Age

Working Decision	15-25	26-35	36-45	46-55	56+	Total
Permanent	10,258	17,097	15,104	12,468	6,548	61,475
	16.69%	27.81%	24.57%	20.28%	10.65%	100%
	7.12%	20.26%	19.07%	18.18%	12.64%	14.36%
Temporary	31,212	24,289	17,920	11,710	6,276	91,407
	34.15%	26.57%	19.6%	12.81%	6.87%	100%
	21.66%	28.78%	22.63%	17.08%	12.11%	21.35%
Other	21,090	21,629	28,510	27,833	21,751	120,813
	17.46%	17.9%	23.6%	23.04%	18%	100%
	14.64%	25.63%	36%	40.59%	41.97%	28.22%
Non-Working	7,578	3,484	1,805	1,227	629	14,723
	51.47%	23.66%	12.26%	8.33%	4.27%	100%
	5.26%	4.13%	2.28%	1.79%	1.21%	3.44%
Out of the labor force	73,955	17,901	15,848	15,332	16,616	139,652
	52.96%	12.82%	11.35%	10.98%	11.9%	100%
	51.32%	21.21%	20.01%	22.36%	32.06%	32.62%
Total	144,093	84,400	79,187	68,570	51,820	428,070
	33.66%	19.72%	18.5%	16.02%	12.11%	100%
	100%	100%	100%	100%	100%	100%

Source: ENEMDU (INEC)

Table 3: Type of Employment Situation by Marital Status

Working Decision	Married	Separated	Single	Total
Permanent	37,033	6,949	17,493	61,475
	60.24%	11.3%	28.46%	100%
	16.47%	16.78%	10.81%	14.36%
Temporary	45,474	8,840	37,093	91,407
	49.75%	9.67%	40.58%	100%
	20.23%	21.34%	22.92%	21.35%
Other	76,417	14,783	29,613	120,813
	63.25%	12.24%	24.51%	100%
	33.99%	35.69%	18.3%	28.22%
Non-Working	4,621	1,660	8,442	14,723
	31.39%	11.27%	57.34%	100%
	2.06%	4.01%	5.22%	3.44%
Out of the labor force	61,292	9,184	69,176	139,652
	43.89%	6.58%	49.53%	100%
	27.26%	22.18%	42.75%	32.62%
Total	224,837	41,416	161,817	428,070
	52.52%	9.68%	37.8%	100%
	100%	100%	100%	100%

Source: ENEMDU (INEC)

Table 4: Type of Employment Situation by Education

Working Decision	None	Basic	Secondary	Higher no Uni	University	Graduate	Total
Permanent	549	12,162	21,253	1,381	23,990	2,140	61,475
	0.89%	19.78%	34.57%	2.25%	39.02%	3.48%	100%
	2.72%	6.99%	13.90%	35.94%	32.40%	65.38%	14.36%
Temporary	3,823	42,998	30,632	681	12,784	489	91,407
	4.18%	47.04%	33.51%	0.75%	13.99%	0.53%	100%
	18.96%	24.73%	20.04%	17.72%	17.27%	14.94%	21.35%
Other	8,025	57,645	39,301	815	14,572	455	120,813
	6.64%	47.71%	32.53%	0.67%	12.06%	0.38%	100%
	39.79%	33.15%	25.71%	21.21%	19.68%	13.90%	28.22%
Non-Working	244	4,036	6,486	170	3,723	64	14,723
	1.66%	27.41%	44.05%	1.15%	25.29%	0.43%	100%
	1.21%	2.32%	4.24%	4.42%	5.03%	1.96%	3.44%
Out of the labor force	7,527	57,033	55,205	796	18,966	125	139,652
	5.39%	40.84%	39.53%	0.57%	13.58%	0.09%	100%
	37.32%	32.80%	36.11%	20.71%	25.62%	3.82%	32.62%
Total	20,168	173,874	152,877	3,843	74,035	3,273	428,070
	4.71%	40.62%	35.71%	0.90%	17.30%	0.76%	100%
	100%	100%	100%	100%	100%	100%	100%

Source: ENEMDU (INEC)

Table 5: Type of Employment Situation by Race

Working Decision	Indigenous	White	Mestizo	Black/Afro	Other	Montubio	Total
Permanent	1,793	2,164	19,644	2,044	34,686	1,144	61,475
	2.92%	3.52%	31.95%	3.32%	56.42%	1.86%	100%
	6.23%	15.04%	15.69%	8.8%	15.10%	16.82%	14.36%
Temporary	5,301	3,041	27,367	6,386	48,075	1,237	91,407
	5.8%	3.33%	29.94%	6.99%	52.59%	1.35%	100%
	18.42%	21.13%	21.85%	27.5%	20.93%	18.19%	21.35%
Other	14,620	3,739	34,069	5,405	61,144	1,836	120,813
	12.1%	3.09%	28.20%	4.47%	50.61%	1.52%	100%
	50.82%	25.98%	27.2%	23.27%	26.63%	27%	28.22%
Non-Working	490	740	5,324	883	7,016	270	14,723
	3.33%	5.03%	36.16%	6%	47.65%	1.83%	100%
	1.7%	5.14%	4.25%	3.80%	3.06%	3.97%	3.44%
Out of the labor force	6,567	4,709	38,835	8,508	78,719	2,314	139,652
	4.70%	3.37%	27.81%	6.09%	56.37%	1.66%	100%
	22.83%	32.72%	31.01%	36.63%	34.28%	34.02%	32.62%
Total	28,771	14,393	125,239	23,226	229,640	6,801	428,070
	6.72%	3.36%	29.26%	5.43%	53.65%	1.59%	100%
	100%	100%	100%	100%	100%	100%	100%

Source: ENEMDU (INEC)

Table 6: Type of Employment Situation by Category of Occupation

Working Decision	Gov. Empl.	Private Empl.	Out-sourced	Journey-man	Patrono	Self Empl.	Unpaid Worker	Domestic	Total
Permanent	20,515	37,408	222	597	0	0	0	2,733	61,475
	33.37%	60.85%	0.36%	0.97%	0%	0%	0%	4.45%	100%
	71.86%	45.58%	24.40%	1.45%	0%	0%	0%	33.28%	21.73%
Temporary	7,254	39,487	619	39,191	0	0	0	4,856	91,407
	7.94%	43.20%	0.68%	42.88%	0%	0%	0%	5.31%	100%
	25.41%	48.12%	68.02%	95.24%	0%	0%	0%	59.14%	32.31%
Other	0	0	0	0	10,728	79,179	30,905	0	120,812
	0%	0%	0%	0%	8.88%	65.54%	25.58%	0%	100%
	0%	0%	0%	0%	99.20%	98.79%	99.60%	0%	42.71%
Non-Working	779	5,170	69	1,363	86	971	124	622	9,184
	8.48%	56.29%	0.75%	14.84%	0.94%	10.57%	1.35%	6.77%	100%
	2.73%	6.3%	7.58%	3.31%	0.8%	1.21%	0.4%	7.58%	3.25%
Total	28,548	82,065	910	41,151	10,814	80,150	31,029	8,211	282,878
	10.09%	29.01%	0.32%	14.55%	3.82%	28.33%	10.97%	2.9%	100%
	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: ENEMDU (INEC)

Table 7: Type of Employment Situation by Years of Career Services

Working Decision	Less than 1 year	More than 1 year	Total
Permanent	9,021	52,454	61,475
	14.67%	85.33%	100%
	15.99%	24.14%	22.46%
Temporary	32,593	58,814	91,407
	35.66%	64.34%	100%
	57.78%	27.07%	33.4%
Other	14,797	106,016	120,813
	12.25%	87.75%	100%
	26.23%	48.79%	44.14%
Total	56,411	217,284	273,695
	20.61%	79.39%	100%
	100%	100%	100%

Source: ENEMDU (INEC)

Table 8: Type of Employment Situation by Size of a Company

Working Decision	Less than 100	More than 100	Total
Permanent	28,056	33,419	61,475
	45.64%	54.36%	100%
	12.51%	67.57%	22.46%
Temporary	75,416	15,991	91,407
	82.51%	17.49%	100%
	33.63%	32.33%	33.40%
Other	120,762	50	120,812
	99.96%	0.04%	100%
	53.86%	0.1%	44.14%
Total	224,234	49,460	273,694
	81.93%	18.07%	100%
	100%	100%	100%

Source: ENEMDU (INEC)

Table 9: Type of Employment Situation by Working Hours

Working Decision	Part Time	Full Time	Total
Permanent	3,973	57,502	61,475
	6.46%	93.54%	100%
	5.74%	28.13%	22.46%
Temporary	19,727	71,680	91,407
	21.58%	78.42%	100%
	28.48%	35.06%	33.4%
Other	45,570	75,243	120,813
	37.72%	62.28%	100%
	65.79%	36.81%	44.14%
Total	69,270	204,425	273,695
	25.31%	74.69%	100%
	100%	100%	100%

Source: ENEMDU (INEC)

Table 10: Type of Employment Situation by Government Cash Transfer

Working Decision	No	Yes	Total
Permanent	60,081	1,394	61,475
	97.73%	2.27%	100%
	15.83%	2.87%	14.36%
Temporary	85,477	5,930	91,407
	93.51%	6.49%	100%
	22.52%	12.22%	21.35%
Other	104,562	16,250	120,812
	86.55%	13.45%	100%
	27.55%	33.49%	28.22%
Non-Working	13,758	965	14,723
	93.45%	6.55%	100%
	3.62%	1.99%	3.44%
Out of the labor force	115,673	23,979	139,652
	82.83%	17.17%	100%
	30.48%	49.42%	32.62%
Total	379,551	48,518	428,069
	88.67%	11.33%	100%
	100%	100%	100%

Source: ENEMDU (INEC)

Table 11: Type of Employment Situation by Region

Working Decision	Sierra	Coast	Amazon	Total
Permanent	37,301	21,044	3,130	61,475
	60.68%	34.23%	5.09%	100%
	17.07%	11.23%	14.21%	14.36%
Temporary	40,922	46,279	4,206	91,407
	44.77%	50.63%	4.6%	100%
	18.72%	24.69%	19.1%	21.35%
Other	68,390	45,085	7,338	120,813
	56.61%	37.32%	6.07%	100%
	31.29%	24.05%	33.32%	28.22%
Non-Working	6,396	7,705	622	14,723
	43.44%	52.33%	4.22%	100%
	2.93%	4.11%	2.82%	3.44%
Out of the labor force	65,563	67,361	6,728	139,652
	46.95%	48.23%	4.82%	100%
	30%	35.93%	30.55%	32.62%
Total	218,572	187,474	22,024	428,070
	51.06%	43.80%	5.14%	100%
	100%	100%	100%	100%

Source: ENEMDU (INEC)

Table 12: Type of Employment Situation by Area

Working Decision	Rural	Urban	Total
Permanent	10,325	51,150	61,475
	16.8%	83.2%	100%
	6.47%	19.05%	14.36%
Temporary	39,906	51,501	91,407
	43.66%	56.34%	100%
	25.01%	19.18%	21.35%
Other	54,403	66,410	120,813
	45.03%	54.97%	100%
	34.1%	24.73%	28.22%
Non-Working	3,287	11,436	14,723
	22.33%	77.67%	100%
	2.06%	4.26%	3.44%
Out of the labor force	51,623	88,029	139,652
	36.97%	63.03%	100%
	32.36%	32.78%	32.62%
Total	159,544	268,526	428,070
	37.27%	62.73%	100%
	100%	100%	100%

Source: ENEMDU (INEC)

Table 13: Comparison of the Different Specifications for Temporary Employment (**N**=152,882)

	LPM		Logit		Probit	
Parameter	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Sex	[Reference category: Female]					
Male	0.027***	0.0025	0.172***	0.0157	0.101***	0.0092
Age	[Reference category: 36-45]					
15-25	0.056***	0.0033	0.349***	0.0222	0.201***	0.0131
26-35	0.037***	0.0029	0.227***	0.0193	0.133***	0.0114
46-55	-0.039***	0.0033	-0.286***	0.0228	-0.170***	0.0133
56-65	-0.067***	0.0041	-0.541***	0.0302	-0.314***	0.0173
Marital Status	[Reference category: Married]					
Separated	0.031***	0.0035	0.214***	0.0229	0.122***	0.0135
Single	0.023***	0.0025	0.168***	0.0167	0.099***	0.0098
Education	[Reference category: University]					
None	0.173***	0.0068	1.051***	0.0608	0.609***	0.0341
Basic	0.135***	0.0033	0.735***	0.0212	0.433***	0.0125
Secondary	0.071***	0.0029	0.331***	0.0178	0.198***	0.0105
Hgher non-University	-0.011	0.0088	-0.066	0.0554	-0.042	0.0325
Graduate	-0.029***	0.0079	-0.120*	0.0549	-0.070*	0.0310
Race	[Reference category: Mestizo]					
Indigenous	0.050***	0.0051	0.267***	0.0381	0.161***	0.0219
White	-0.004	0.0057	-0.025	0.0378	-0.014	0.0223
Black-Afro	-0.022***	0.0047	-0.128***	0.0364	-0.070**	0.0211
Other	0.011***	0.0022	0.069***	0.0152	0.047***	0.0089
Montubio	-0.022**	0.0081	-0.146**	0.0548	-0.084**	0.0319
Category Ocupation	[Reference category: Government employee]					
Private	-0.014***	0.0037	-0.227***	0.0234	-0.121***	0.0138
Outsourced	0.246***	0.0137	1.190***	0.0877	0.683***	0.0499
Journeyman/Pawn	0.370***	0.0048	3.662***	0.0490	1.897***	0.0228
Domestic Empl.	0.017**	0.0063	-0.134***	0.0384	-0.063**	0.0227
Duration in a company	[Reference category: Less than 1 year]					
More than 1 year	-0.256***	0.0024	-1.480***	0.0162	-0.876***	0.0095
Size of company	[Reference category: Less than 100 employees]					
More than 100	-0.164***	0.0031	-0.819***	0.0190	-0.490***	0.0112
Working hours	[Reference category: Full time]					
Part time	0.102***	0.0029	0.911***	0.0227	0.521***	0.0131
Gov. Cash Transf.	[Reference category: No]					
Yes	0.086***	0.0050	0.512***	0.0373	0.295***	0.0214
Region	[Reference category: Sierra-Highlands]					
Coast	0.093***	0.0022	0.651***	0.0146	0.378***	0.0086
Amazon	0.055***	0.0048	0.355***	0.0317	0.201***	0.0185
Area	[Reference category: Urban]					
Rural	0.036***	0.0025	0.254***	0.0176	0.139***	0.0102
Intercept	0.544***	0.0054	0.296***	0.0349	0.165***	0.0205
Log-Lik Full Model:	-71441.236		-65918.566		-66079.482	
Adjusted R2:	0.380		-		-	
McFadden's Adj R2:	-		0.360		0.359	
Cragg-Uhler(Nagelkerke) R2:	-		0.520		0.518	
AIC:	142940.471		131895.132		132216.964	
BIC':	143228.656		132183.317		132505.149	

$^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$

Table 14: Logistic Regression for Temporary Employment (**N**=152,882)

Parameter	Coef.	Std. Err.	dy/dx	Odds Ratio
Sex	[Reference category: Female]			
Male	0.172***	0.0157	0.034	1.188
Age	[Reference category: 36-45]			
15-25	0.349***	0.0222	0.063	1.418
26-35	0.227***	0.0193	0.043	1.255
46-55	-0.286***	0.0228	-0.060	0.751
56-65	-0.541***	0.0302	-0.119	0.582
Marital Status	[Reference category: Married]			
Separated	0.214***	0.0229	0.041	1.239
Single	0.168***	0.0167	0.032	1.183
Education	[Reference category: University]			
None	1.051***	0.0608	0.189	2.860
Basic	0.735***	0.0212	0.143	2.085
Secondary	0.331***	0.0178	0.071	1.393
Hgher non-University	-0.066	0.0554	-0.015	0.936
Graduate	-0.120*	0.0549	-0.028	0.887
Race	[Reference category: Mestizo]			
Indigenous	0.267***	0.0381	0.049	1.306
White	-0.025	0.0378	-0.005	0.975
Black-Afro	-0.128***	0.0364	-0.026	0.880
Other	0.069***	0.0152	0.013	1.071
Montubio	-0.146**	0.0548	-0.030	0.864
Category Ocupation	[Reference category: Government employee]			
Private	-0.227***	0.0234	-0.056	0.797
Outsourced	1.190***	0.0877	0.250	3.286
Journeyman/Pawn	3.662***	0.0490	0.427	38.930
Domestic Empl.	-0.134***	0.0384	-0.033	0.875
Duration in a company	[Reference category: Less than 1 year]			
More than 1 year	-1.480***	0.0162	-0.237	0.228
Size of company	[Reference category: Less than 100 employees]			
More than 100	-0.819***	0.0190	-0.167	0.441
Working hours	[Reference category: Full time]			
Part time	0.911***	0.0227	0.148	2.487
Gov. Cash Transf.	[Reference category: No]			
Yes	0.512***	0.0373	0.087	1.669
Region	[Reference category: Sierra-Highlands]			
Coast	0.651***	0.0146	0.123	1.917
Amazon	0.355***	0.0317	0.072	1.426
Area	[Reference category: Urban]			
Rural	0.254***	0.0176	0.048	1.290
Intercept	0.296***	0.0349		1.344

$^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$

Table 15: Logistic Regression for Temporary Employment with Sex Interaction (**N**=152,882)

Parameter	Coef.	Std. Err.	dy/dx	Odds Ratio
Sex		[Reference category: Female]		
Men	0.813***	0.1400	0.165	2.254
Age		[Reference category: 36-45]		
15 -25	0.247***	0.0290	0.046	1.281
26-35	0.157***	0.0252	0.030	1.170
46-55	-0.192***	0.0296	-0.039	0.826
56-65	-0.400***	0.0377	-0.085	0.670
Marital Status		[Reference category: Married]		
Separated	0.196***	0.0366	0.038	1.216
Single	0.223***	0.0220	0.043	1.250
Education		[Reference category: University]		
None	1.010***	0.0785	0.182	2.745
Basic	0.714***	0.0269	0.139	2.042
Secondary	0.313***	0.0237	0.067	1.368
Higher non-University	-0.043	0.0766	-0.010	0.958
Graduate	-0.162*	0.0785	-0.037	0.850
Race		[Reference category: Mestizo]		
Indigenous	0.287***	0.0491	0.051	1.332
White	-0.004	0.0492	-0.001	0.996
Black-Afro	-0.181***	0.0455	-0.036	0.835
Other	0.010	0.0197	0.002	1.010
Montubio	-0.181*	0.0710	-0.036	0.835
Category Ocupation		[Reference category: Government employee]		
Government	-3.870***	0.0554	-0.466	0.021
Private	-3.877***	0.0473	-0.468	0.021
Outsourced	-2.536***	0.1070	-0.180	0.079
Domestic Empl.	-4.272***	0.1170	-0.565	0.014
Duration in a company		[Reference category: Less than 1 year]		
More than 1 year	-1.440***	0.0214	-0.232	0.237
Size of company		[Reference category: Less than 100 employees]		
More than 100	-0.890***	0.0230	-0.182	0.411
Working hours		[Reference category: Full time]		
Part time	1.017***	0.0349	0.162	2.765
Gov. Cash Transf.		[Reference category: No]		
Yes	0.379**	0.1200	0.067	1.461
Region		[Reference category: Sierra-Highlands]		
Coast	0.630***	0.0188	0.119	1.877
Amazon	0.376***	0.0411	0.077	1.457
Area		[Reference category: Urban]		
Rural	0.198***	0.0222	0.037	1.219
Age x Sex				
(15 -25)×Sex	0.242***	0.0454	0.044	1.274
(26-35)×Sex	0.178***	0.0393	0.033	1.195
(46-55)×Sex	-0.244***	0.0468	-0.049	0.784
(56-65)×Sex	-0.411***	0.0641	-0.086	0.663
MaritalSt x Sex				
(Separated)×Sex	0.041	0.0475	0.008	1.042
(Single)×Sex	-0.119***	0.0341	-0.023	0.888

Table 15: Logistic Regression for Temporary Employment with Sex Interaction (**N**=152,882)

Parameter	Coef.	Std. Err.	dy/dx	Odds Ratio
Education x Sex				
(None)×Sex	0.172	0.1250	0.032	1.188
(Basic)×Sex	0.053	0.0446	0.010	1.055
(Secondary)×Sex	0.102**	0.0363	0.019	1.107
(Higher non-University)×Sex	-0.037	0.111	-0.007	0.964
(Graduate)×Sex	0.051	0.110	0.010	1.052
Race x Sex				
(Indigenous)×Sex	-0.060	0.0782	-0.012	0.942
(White)×Sex	-0.044	0.0774	-0.008	0.957
(Black-Afro)×Sex	0.112	0.0762	0.021	1.118
(Other)×Sex	0.150***	0.0311	0.028	1.162
(Montubio)×Sex	0.107	0.112	0.020	1.112
Catoccupation x Sex				
(Government)×Sex	0.771***	0.130	0.125	2.162
(Private)×Sex	0.288*	0.121	0.053	1.333
(Outsourced)×Sex	0.556*	0.247	0.092	1.743
(Domestic Empl.)×Sex	0.972***	0.163	0.146	2.644
Duration comp x Sex				
(More than 1 year)×Sex	-0.101**	0.0328	-0.020	0.904
Sizeofcompany x Sex				
(More than 100)×Sex	0.229***	0.0410	0.042	1.257
Workinghours x Sex				
(Part time)×Sex	-0.142**	0.0464	-0.027	0.867
Gov.CashTransf. x Sex				
(Yes)×Sex	0.167	0.127	0.031	1.182
Region x Sex				
(Coast)×Sex	0.037	0.0303	0.007	1.038
(Amazon)×Sex	-0.054	0.0648	-0.012	0.948
Area x Sex				
(Rural)×Sex	0.124***	0.0369	0.024	1.132
Intercept	3.434***	0.119		31.017

$^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$

Table 16: Results of Fairlie Decomposition for Temporary Employment

Number of Obs.	=	152,882
Number of Obs. (male)	=	101,183
Number of Obs. (female)	=	51,669
Pr(Y!=0|G=0)	=	0.649
Pr(Y!=0|G=1)	=	0.498
Explained gender difference	=	0.151
Total gender difference	=	0.082

Parameter	Coef.	Std. Err.	%
Age	-0.088***	0.0079	0.056
Marital Status	0.116***	0.0104	-0.278
Education	-0.202***	0.0082	2.194
Race	-0.025***	0.0072	0.019
Category Ocupation	1.199***	0.0128	7.484
Duration in a company	-1.338***	0.0213	-1.650
Size of company	-0.523***	0.0201	0.827
Working hours	-1.063***	0.0340	-1.084
Government Cash Transfer	0.418***	0.112	-0.387
Region	0.435***	0.0147	0.480
Area	-0.394***	0.0206	0.546
Intercept	1.759***	0.0543	

$^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$

Table 17: Multinomial Logistic Regression for Female† (**N**=219,777)

	Permanent			Other			Non-Working			Out of the labor force		
Parameter	Coef.	Std. Err.	RRR	Coef.	Std. Err.	RRR	Coef.	Std. Err.	RRR	Coef.	Std. Err.	RRR
Age					[Reference category: 36-45]							
15-25	-1.171***	0.0308	0.310	-0.751***	0.0257	0.472	0.725***	0.0440	2.064	0.952***	0.0235	2.591
26-35	-0.458***	0.0259	0.633	-0.573***	0.0224	0.564	0.263***	0.0420	1.301	-0.224***	0.0219	0.800
46-55	0.524***	0.0306	1.688	0.509***	0.0266	1.663	0.134*	0.0554	1.143	0.582***	0.0267	1.790
56-65	0.930***	0.0418	2.534	1.088***	0.0362	2.969	-0.072	0.0857	0.930	1.582***	0.0358	4.865
Marital Status					[Reference category: Married]							
Separated	-0.372***	0.0258	0.690	-0.619***	0.0217	0.539	-0.204***	0.0396	0.815	-1.472***	0.0220	0.230
Single	-0.081***	0.0237	0.922	-0.599***	0.0208	0.550	-0.087*	0.0341	0.917	-0.698***	0.0190	0.498
Education					[Reference category: University]							
None	-2.189***	0.0799	0.112	0.676***	0.0445	1.965	-0.260**	0.0975	0.771	0.957***	0.0426	2.604
Basic	-1.368***	0.0275	0.255	0.712***	0.0239	2.038	-0.153***	0.0385	0.858	0.776***	0.0216	2.173
Secondary	-0.717***	0.0228	0.488	0.712***	0.0226	2.037	0.137***	0.0331	1.147	0.744***	0.0201	2.105
Hgher non-University	0.024	0.0717	1.024	0.090	0.0793	1.094	-0.009	0.124	0.991	0.037	0.0733	1.037
Graduate	0.291***	0.0736	1.338	-0.855***	0.106	0.425	-0.517**	0.177	0.596	-1.712***	0.133	0.181
Race					[Reference category: Mestizo]							
Indigenous	-0.016	0.0515	0.985	0.644***	0.0334	1.904	-0.512***	0.0737	0.599	-0.398***	0.0340	0.672
White	0.012	0.0515	1.012	-0.042	0.0447	0.959	0.0983	0.0649	1.103	-0.0012	0.0408	0.999
Black-Afro	0.078	0.0528	1.081	-0.224***	0.0415	0.800	0.0557	0.0615	1.057	0.234***	0.0362	1.263
Other	-0.073***	0.0204	0.930	-0.040*	0.0177	0.961	-0.316***	0.0289	0.729	0.172***	0.0163	1.187
Montubio	0.082	0.0738	1.086	0.152*	0.0676	1.164	0.101	0.104	1.107	0.345***	0.0629	1.412
Gov. Cash Transf.					[Reference category: No]							
Yes	-0.885***	0.0359	0.413	-0.166***	0.0219	0.847	-0.208***	0.0429	0.812	0.085***	0.0209	1.089
Region					[Reference category: Sierra-Highlands]							
Coast	-0.403***	0.0202	0.668	-0.333***	0.0171	0.717	0.408***	0.0282	1.504	0.423***	0.0157	1.526
Amazon	-0.034	0.0424	0.966	-0.097**	0.0351	0.908	-0.094	0.0676	0.911	0.101**	0.0335	1.107
Area					[Reference category: Urban]							
Rural	-0.446***	0.0253	0.640	0.243***	0.0183	1.276	-0.276***	0.0329	0.759	0.079***	0.0170	1.082
Intercept	1.354***	0.0295	3.874	0.705***	0.0282	2.024	-1.421***	0.0487	0.242	0.371***	0.0267	1.448

$^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$

†Base Category: Temporary Employment

Table 18: Multinomial Logistic Regression for Male† (**N**=208,292)

	Permanent			Other			Non-Working			Out of the labor force		
Parameter	Coef.	Std. Err.	RRR	Coef.	Std. Err.	RRR	Coef.	Std. Err.	RRR	Coef.	Std. Err.	RRR
Age	[Reference category: 36-45]											
15-25	-0.678***	0.0239	0.508	-0.870***	0.0195	0.419	0.535***	0.0470	1.707	2.038***	0.0393	7.673
26-35	-0.216***	0.0206	0.806	-0.634***	0.0180	0.530	0.083	0.0485	1.086	-0.101*	0.0452	0.904
46-55	0.225***	0.0229	1.253	0.442***	0.0185	1.556	0.315***	0.0580	1.370	1.011***	0.0484	2.749
56-65	0.428***	0.0274	1.535	0.884***	0.0213	2.420	0.819***	0.0633	2.267	2.590***	0.0452	13.326
Marital Status	[Reference category: Married]											
Separated	-0.294***	0.0295	0.746	-0.113***	0.0238	0.893	0.560***	0.0565	1.751	0.533***	0.0429	1.704
Single	-0.382***	0.0187	0.682	0.011	0.0154	1.011	1.009***	0.0345	2.742	2.039***	0.0245	7.686
Education	[Reference category: University]											
None	-2.440***	0.0628	0.087	-0.827***	0.0343	0.437	-1.259***	0.105	0.284	-0.073	0.0443	0.930
Basic	-1.664***	0.0217	0.189	-0.499***	0.0201	0.607	-1.001***	0.0387	0.368	-0.846***	0.0243	0.429
Secondary	-0.737***	0.0199	0.478	-0.139***	0.0201	0.870	-0.421***	0.0352	0.656	-0.453***	0.0234	0.636
Hgher non-University	0.136*	0.0689	1.146	-0.0374	0.0746	0.963	0.069	0.127	1.072	-0.578***	0.0989	0.561
Graduate	0.486***	0.0734	1.626	-0.527***	0.0891	0.590	-0.369*	0.186	0.691	-0.711***	0.161	0.491
Race	[Reference category: Mestizo]											
Indigenous	-0.123**	0.0388	0.884	0.672***	0.0251	1.958	-0.010	0.0720	0.990	0.191***	0.0352	1.210
White	0.0511	0.0402	1.052	0.0301	0.0337	1.031	0.237***	0.0639	1.267	0.188***	0.0437	1.207
Black-Afro	-0.108**	0.0359	0.898	-0.137***	0.0257	0.872	-0.015	0.0574	0.985	-0.042	0.0353	0.959
Other	0.007	0.0159	1.007	-0.026	0.0135	0.975	-0.157***	0.0286	0.854	0.268***	0.0173	1.308
Montubio	0.126*	0.0562	1.134	0.121*	0.0489	1.128	0.186*	0.0944	1.204	0.357***	0.0613	1.429
Gov. Cash Transf.	[Reference category: No]											
Yes	-0.804***	0.0977	0.447	0.232***	0.0428	1.261	-0.057	0.144	0.945	1.484***	0.0509	4.412
Region	[Reference category: Sierra-Highlands]											
Coast	-0.683***	0.0151	0.505	-0.407***	0.0125	0.666	-0.068*	0.0273	0.934	-0.481***	0.0160	0.618
Amazon	-0.063	0.0331	0.939	0.065*	0.0268	1.068	-0.002	0.0637	0.998	-0.116***	0.0351	0.891
Area	[Reference category: Urban]											
Rural	-0.798***	0.0173	0.450	-0.025	0.0128	0.976	-1.090***	0.0329	0.336	-0.822***	0.0167	0.440
Intercept	1.221***	0.0247	3.390	0.640***	0.0234	1.896	-2.085***	0.0535	0.124	-2.647***	0.0454	0.071

$^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$

†Base Category: Temporary Employment

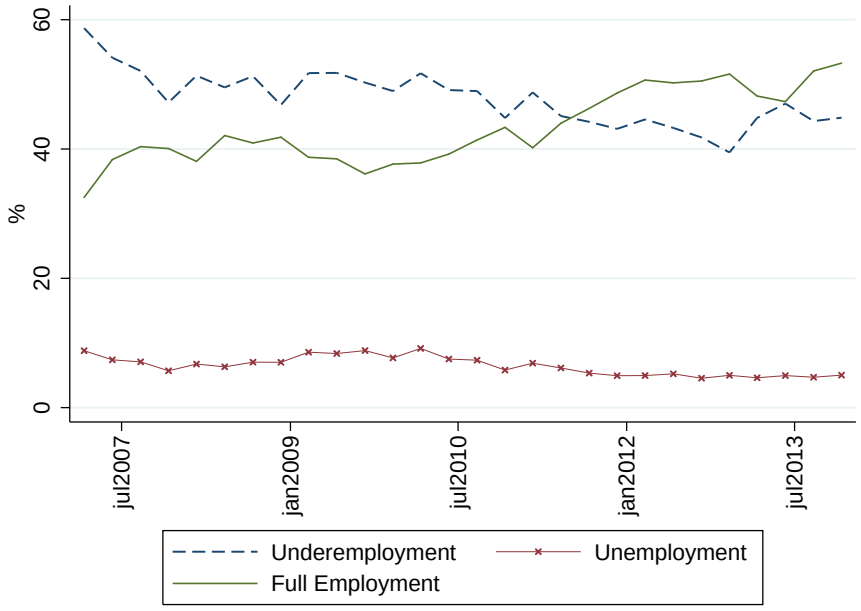
Table 19: Seemingly Unrelated Bivariate Probit (**N**=282,878)

	Temporary Employment		Participate		Pr(Temp1=1,Participate=1)	
Parameter	Coef.	Std. Err.	Coef.	Std. Err.	dy/dx	Delta-method Std. Err
Sex			[Reference category: Female]			
Men	0.043***	0.0082	0.171***	0.011	0.008***	0.001
Age			[Reference category: 36-45]			
15 -25	0.346***	0.0113	-0.209***	0.0161	0.058***	0.002
26-35	0.158***	0.0102	-0.100***	0.0151	0.027***	0.002
46-55	-0.174***	0.0120	-0.017	0.0181	-0.029***	0.002
56-65	-0.292***	0.0154	-0.057**	0.0218	-0.049***	0.003
Marital Status			[Reference category: Married]			
Separated	0.117***	0.0119	-0.139***	0.0157	0.019***	0.002
Single	0.082***	0.0086	-0.174***	0.0119	0.013***	0.001
Education			[Reference category: University]			
None	0.620***	0.0281	0.104*	0.0357	0.106***	0.005
Basic	0.410***	0.0111	0.102***	0.0157	0.071***	0.002
Secondary	0.199***	0.0095	-0.037*	0.0134	0.035***	0.002
Higher non-University	-0.045	0.0302	-0.014	0.0459	-0.008	0.005
Graduate	-0.159***	0.0297	0.348***	0.0599	-0.027***	0.005
Race			[Reference category: Mestizo]			
Indigenous	0.166***	0.0192	0.160***	0.0278	0.028***	0.003
White	-0.020	0.0193	-0.060*	0.0245	-0.004	0.003
Black-Afro	-0.032	0.0177	-0.013	0.0224	-0.005	0.003
Other	0.056***	0.0078	0.112***	0.0108	0.010***	0.001
Montubio	-0.091	0.0280	-0.022	0.0364	-0.01**	0.005
Category Ocupation			[Reference category: Government employee]			
Private	0.323***	0.0104	-0.325***	0.0185	0.119***	0.004
Outsourced	0.764***	0.0438	-0.412***	0.0612	0.280***	0.015
Journeyman/Pawn	1.809***	0.0156	-0.083**	0.0241	0.538***	0.004
Patrono	-7.100	3553.175	0.484***	0.0461	-0.374***	0.004
Self Employed	-7.265	1269.389	0.267***	0.0215	-0.374***	0.004
Unpaid Work	-7.444	2008.666	0.664***	0.0353	-0.374***	0.004
Domestic Empl.	0.461***	0.0183	-0.351***	0.0284	0.171***	0.007
Gov. Cash Transf.			[Reference category: No]			
Yes	0.290***	0.0178	-0.059*	0.0212	0.0474***	0.003
Region			[Reference category: Sierra-Highlands]			
Coast	0.258***	0.0075	-0.132***	0.0105	0.043***	0.001
Amazon	0.197***	0.0165	0.008	0.0245	0.033***	0.003
Area			[Reference category: Urban]			
Rural	0.197***	0.0090	0.354***	0.0133	0.034***	0.002
Intercept	-0.970***	0.0138	1.892***	0.0221		
/athrho	2.076***	0.0429				
rho	0.969***	0.0026				

Likelihood-ratio test of rho=0: chi2(1) = 18353.5 Prob > chi2 = 0.0000

$^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < 0.001$

Figure 1: Evolution of the Employment, Underemployment and Unemployment

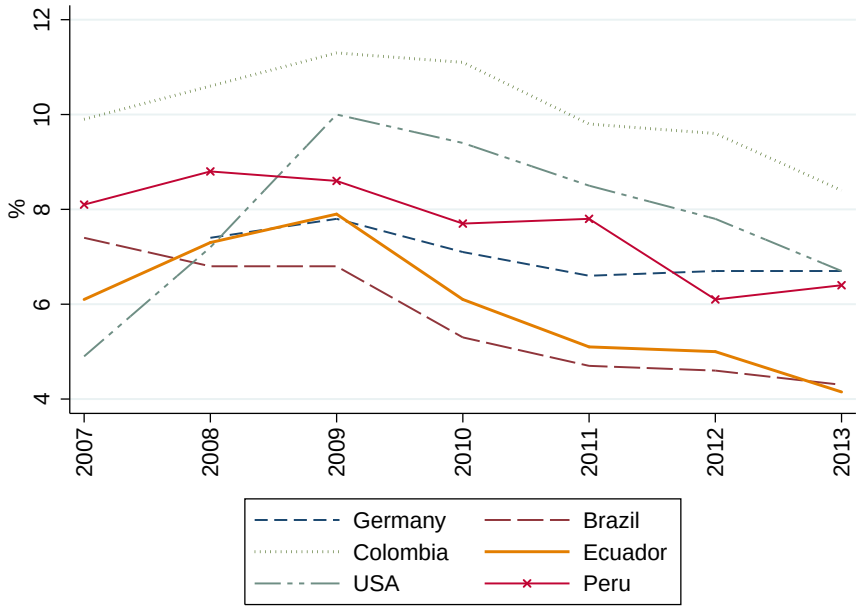


Source: ENEMDU (INEC)

Figure 2: Unemployment Rate for Men and Women

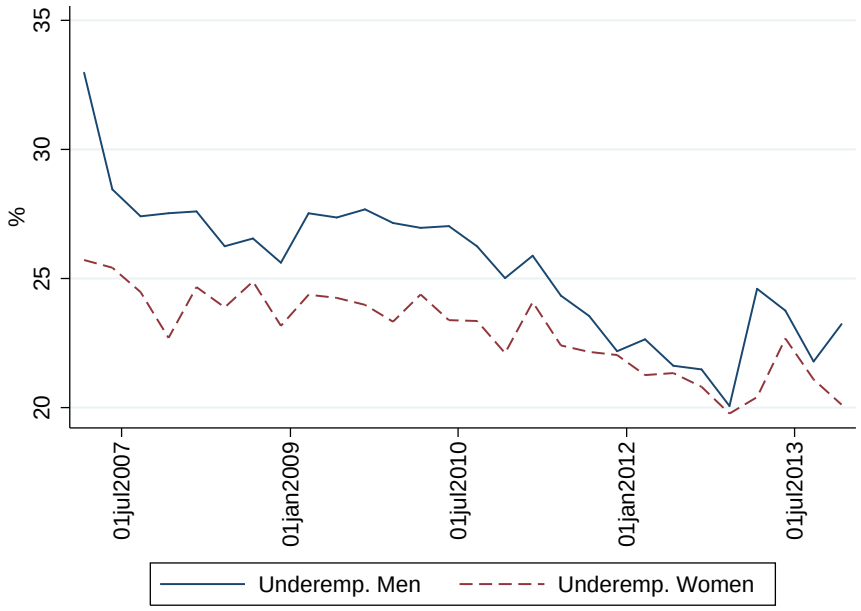
Source: ENEMDU (INEC)

Figure 3: Comparison of Unemployment Rates



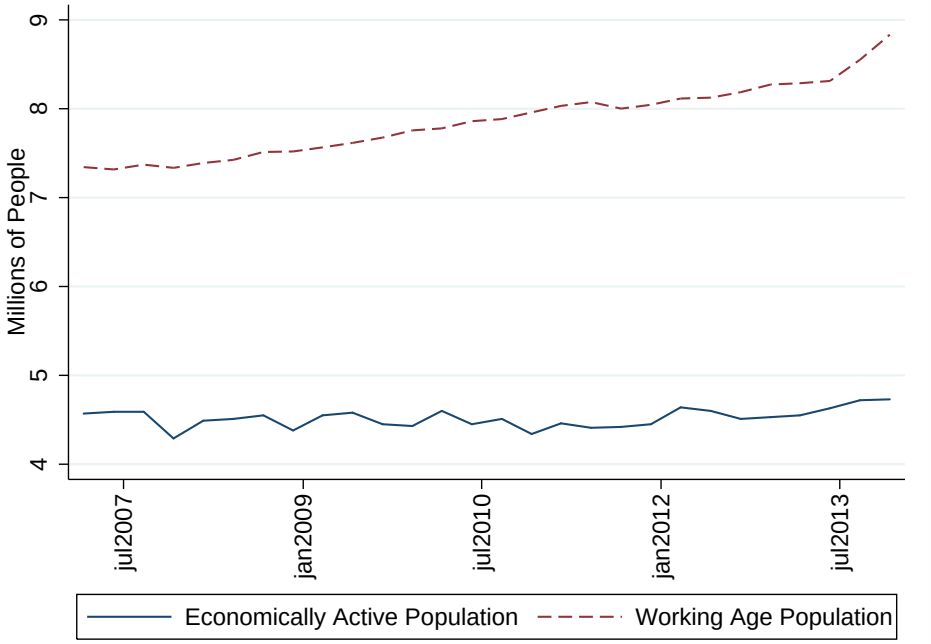
Source: ENEMDU (INEC)

Figure 4: Underemployment Rate for Men and Women



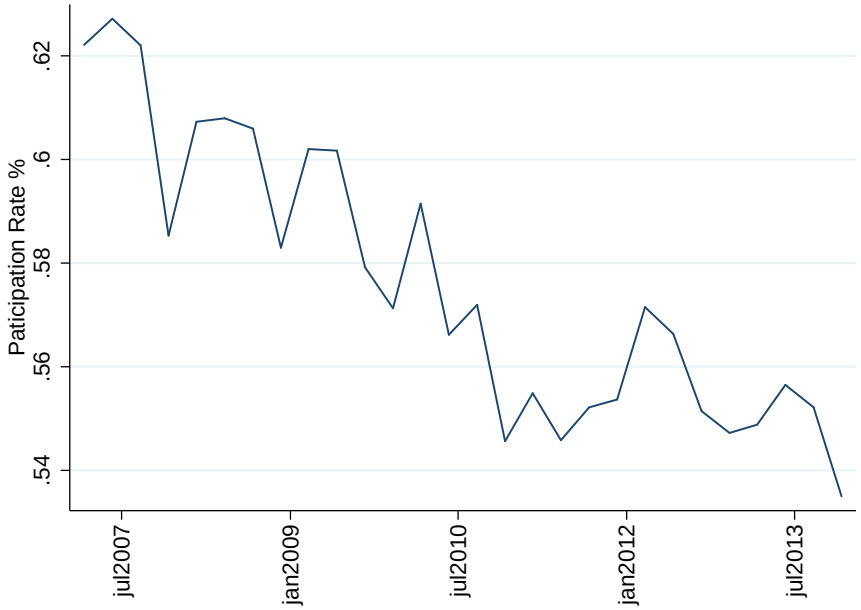
Source: ENEMDU (INEC)

Figure 5: Economically Active Population (PEA) and Working Age Population



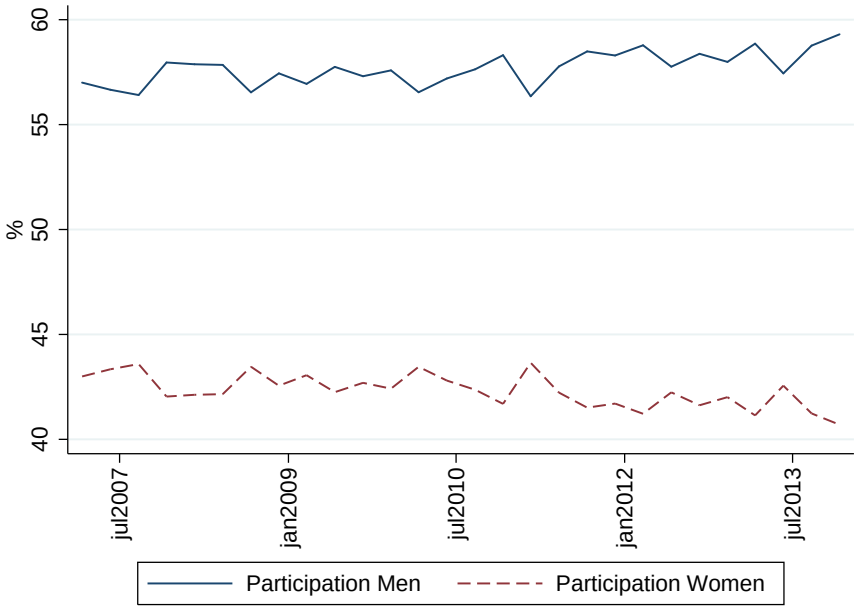
Source: ENEMDU (INEC)

Figure 6: Participation Rate



Source: ENEMDU (INEC)

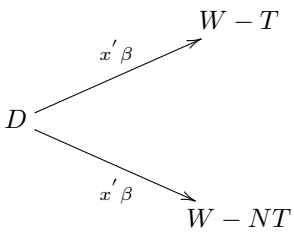
Figure 7: Participation Rate for Men and Women



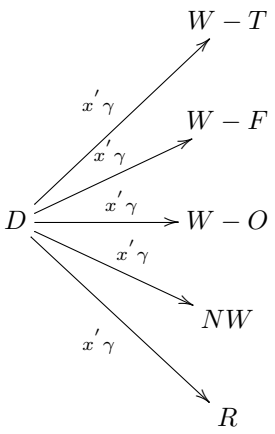
Source: ENEMDU (INEC)

Figure 8: Conceptualization of the Decision process Made by a Person in the Labor Market

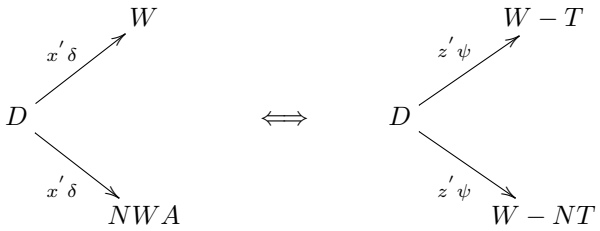
(a) Logit/Probit Model



(b) Multinomial Probit



(c) Seemingly Unrelated Bivariate Probit



D: Decision of the person W-T: Work under temporary contract. W-NT: Work under no temporary contract. W-F: Work under permanent contract. W-O: Work under other circumstances (Self-employment, etc.). N-W: No working (unemployed). R: Retired or non-working voluntarily. W: Work. NWA:No working all (unemployed, retired, etc.).